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Vol. 25 Toronto, January 4, 1911 No. 1

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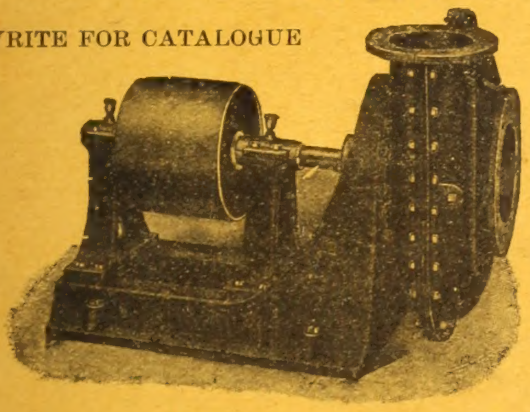
Contract Record

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

2783-P



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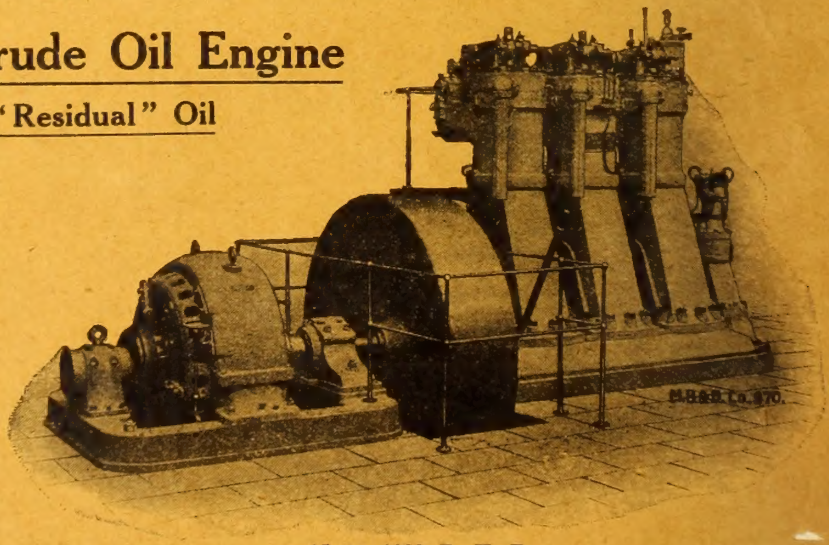

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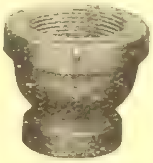

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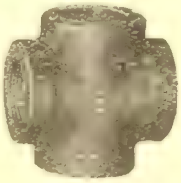

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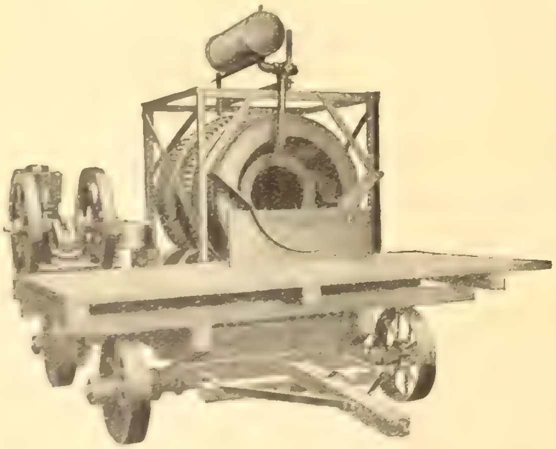

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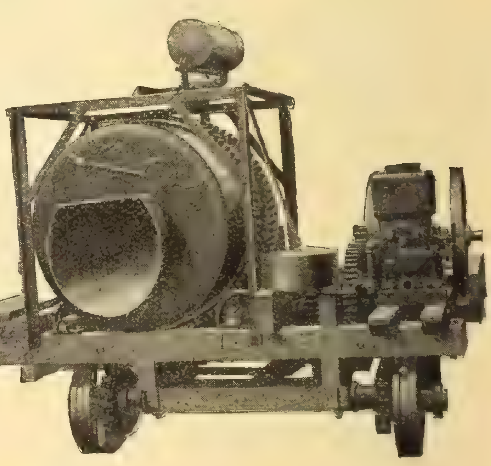

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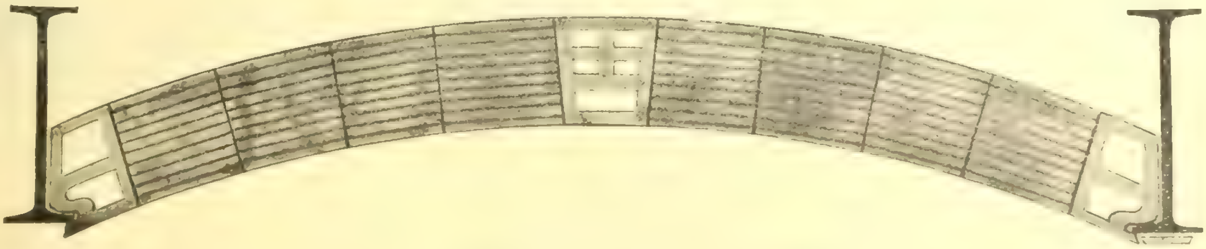

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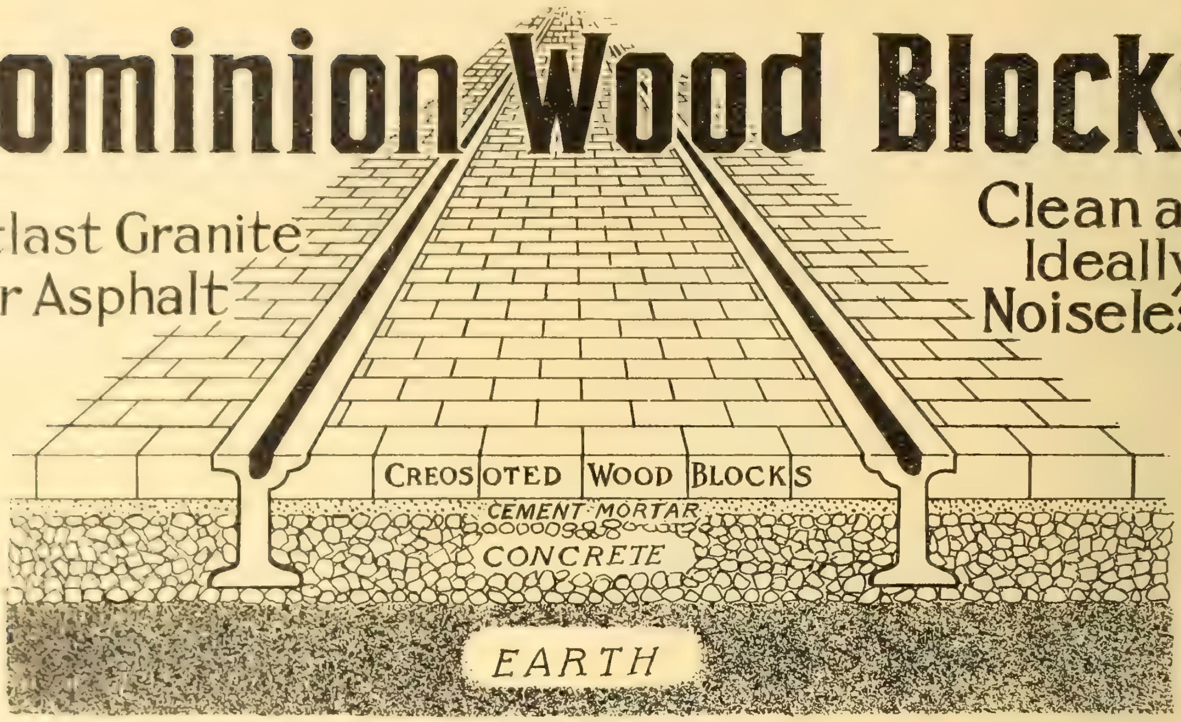

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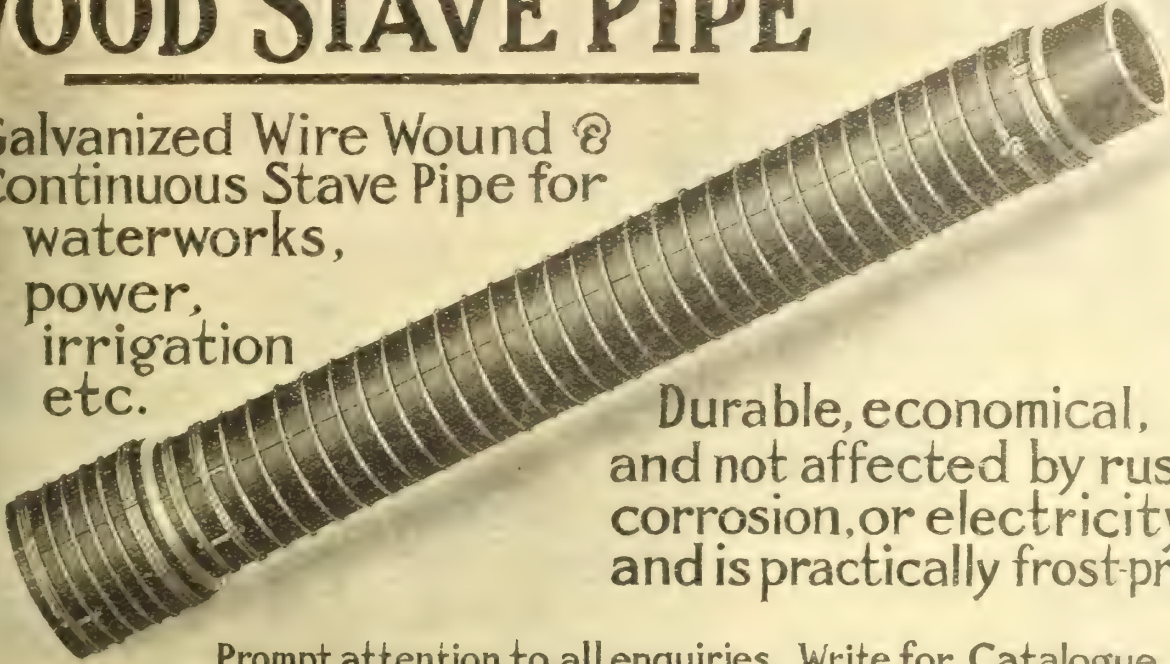

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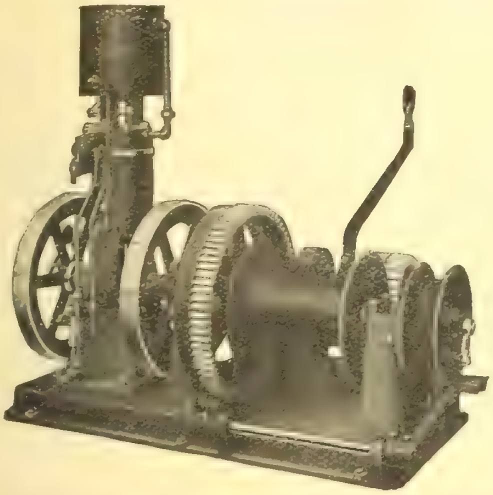

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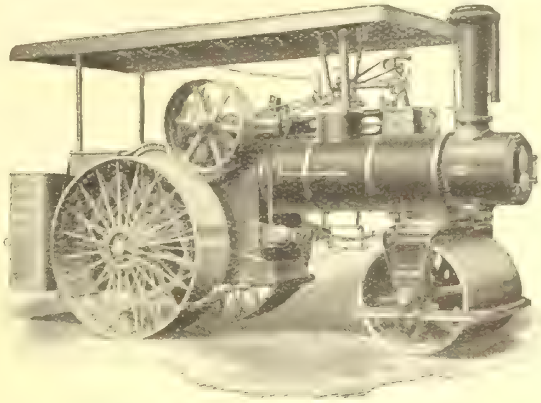

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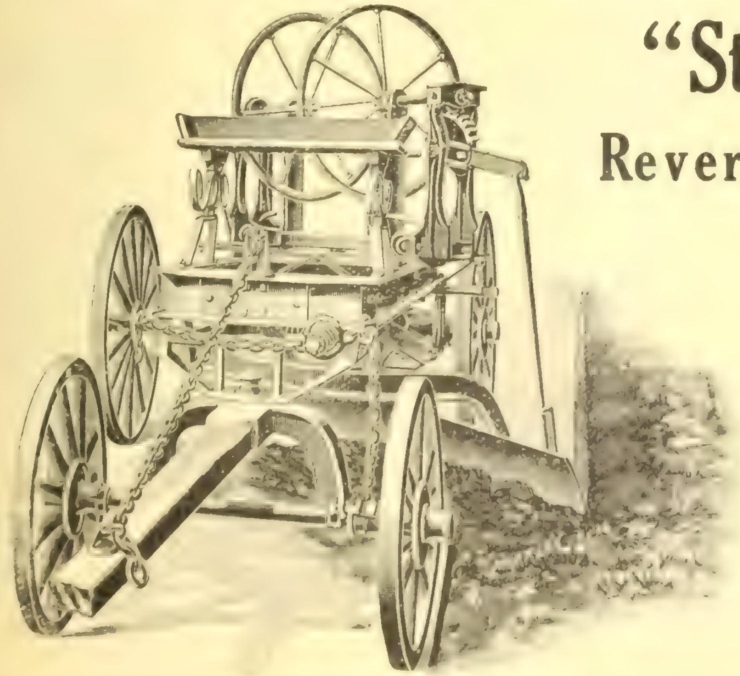

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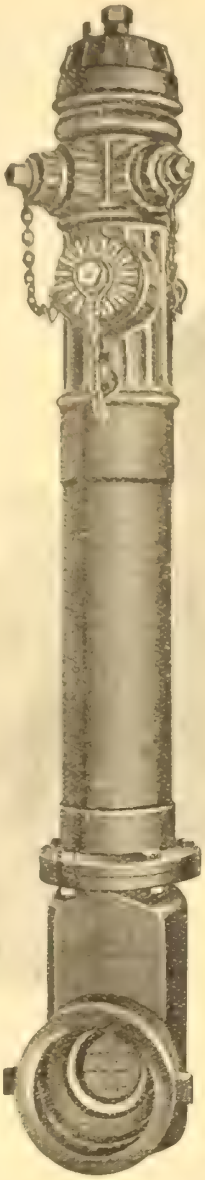

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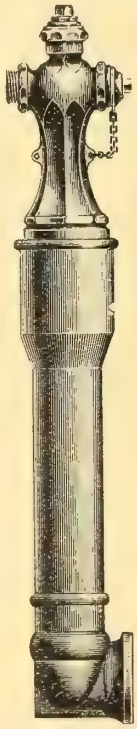

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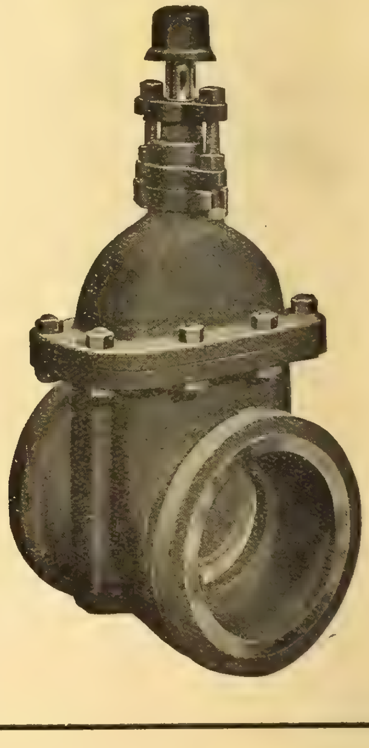

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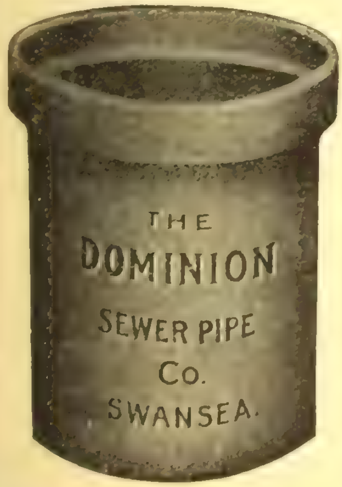

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We can serve you best. Our prices are right. The quality of our goods is of the highest excellence. We are the largest manufacturers of **Vitrified Salt Glazed Sanitary Sewer Pipe** in the world. Sizes, 3 in., 4 in., 5 in., 6 in., 8 in., 9 in., 10 in., 12 in., 15 in., 18 in., 20 in., 22 in., 24 in., 27 in., 30 in., 33 in., 36 in., 42 in. Lengths, 2 to 3 ft. Socket, Standard or Deep and Wide. Thickness in sizes 15 in., to 42 in., both Standard and Double Strength. We also manufacture Flue Linings, Wall Coping, Vitrified Conduit, Vitrified Curb, Paving Blocks, Drain Tile, etc.

Send for Catalogue.

201 Devonshire St., Boston, Mass.

Round Pipe and Square Dealings

PRICES ALWAYS RIGHT

Are two very important factors in our business. If you have not already proved this to be a fact, you will find an opportunity to do so when next you need

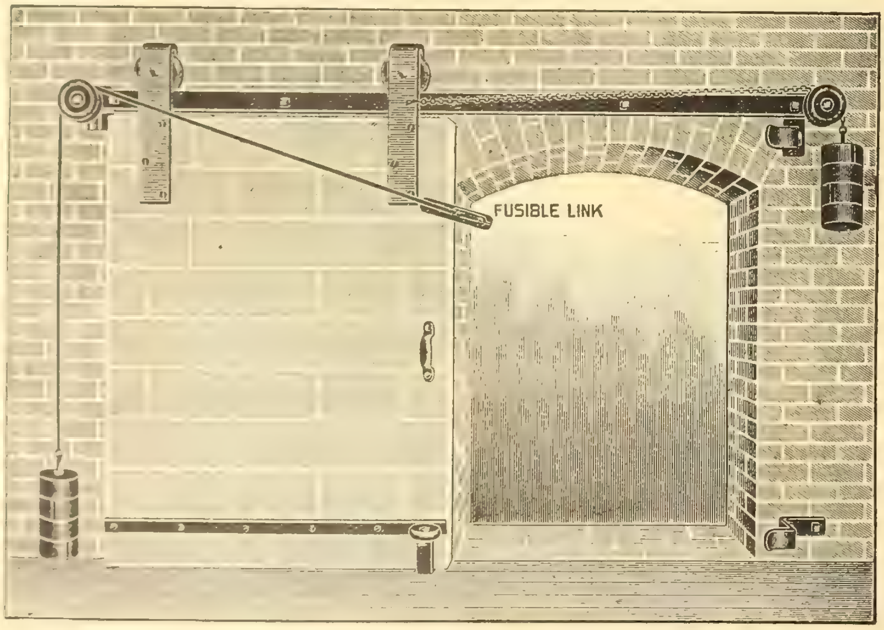
Vitrified Sewer Pipe

Big stock 4 inch to 24 inch.

How soon may we hear from you in 1911?

The ONTARIO SEWER PIPE COMPANY, Limited
MIMICO, ONTARIO
Telephones:—Toronto Connection, Park 422—Evenings, Park 3888 and 3889

Level Slide Fire Door



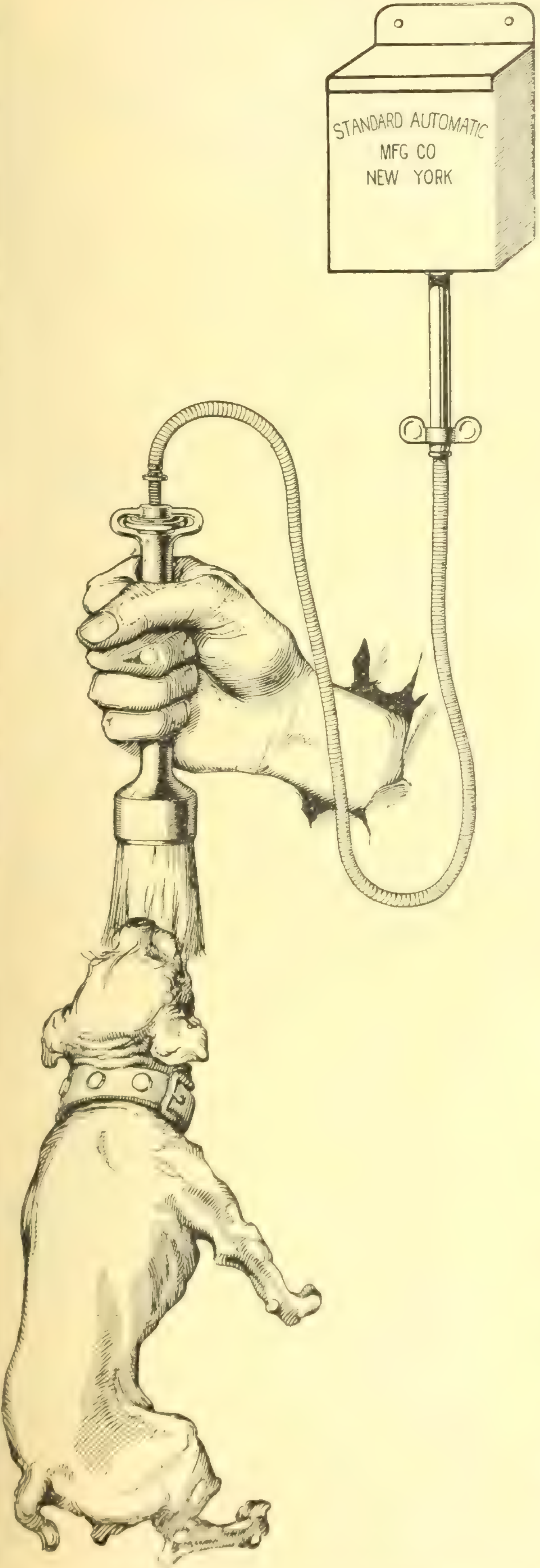
Fireproof Doors and Windows

We are specialists in this particular line and can solve your most difficult problems.

Estimates furnished on complete work or any part.

Have you our Literature?

DB DOUGLAS BROS LIMITED DB
TORONTO, ONT. MONTREAL, P.Q.



THE

Standard Automatic Brush

does your painting work in a new way, better, quicker, cheaper, eliminating all waste of paint. An equal flow at all times; thickness of coat can be accurately adjusted. Absolutely clean and fireproof.

THE STANDARD AUTOMATIC SYSTEM

does away with the paint can. It eliminates the dip and is far superior to the spray, but it does rub it in. No air pressure is needed. Will work with any kind of paint. Get next to this new method. Made especially for manufacturers of automobiles, automobile bodies and wheels, all kinds of vehicles, carriages, etc. It is most useful for manufacturers of furniture. It will also save a lot of time in painting structural work, such as bridges, elevated roads, etc. House and sign painting can be done effectively and quick.

Wherever duplication of work exists, this device will increase your output and reduce the cost. Buy just one outfit to-day and be convinced. We are sure that we will have to equip your entire plant. Special equipments can be made to suit your purpose.

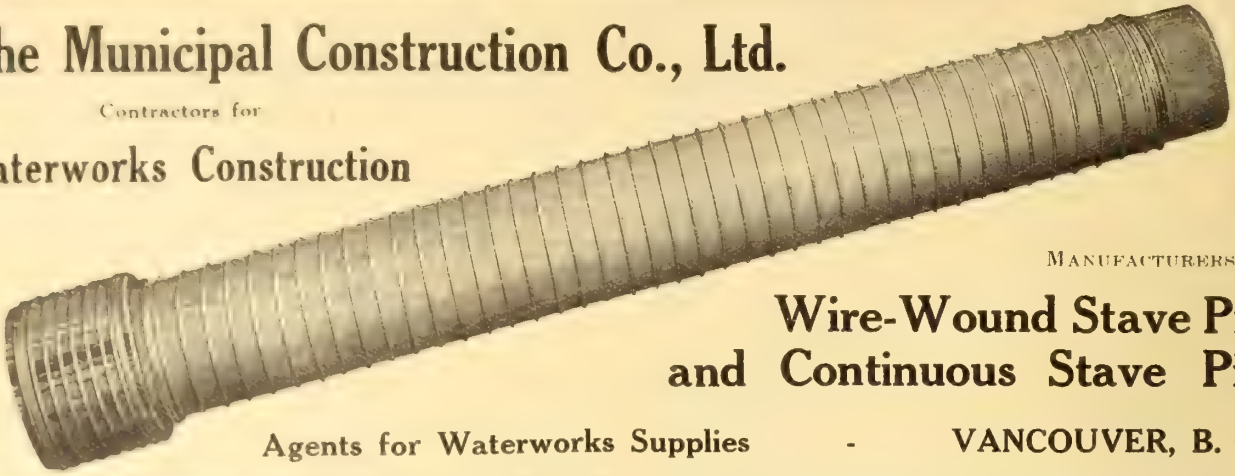
Complete outfit consisting of a large paint tank, either stationary or movable, with automatic valve and six feet of flexible tubing together with the automatic adjustable brush made of aluminum, costs $7.50, and it is still cheaper than the ordinary brush.

The outfit is also made with a tank to be strapped on the back which will cost $2.50 extra.

Our booklet will tell you why. Write for one to-day. Send in your order. Your outlay will only be once. Apparatus will last a life-time. Let us know to-day what you are manufacturing and we will effect a saving for you.

Jobbers and Dealers wanted everywhere.

Standard Automatic Manufacturing
COMPANY
50 CHURCH ST., NEW YORK.



The Municipal Construction Co., Ltd.

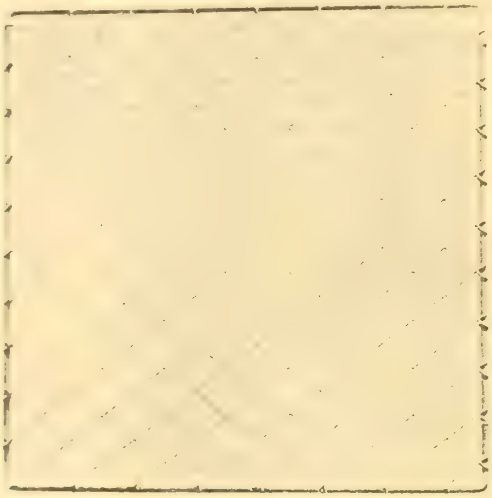
Contractors for

Waterworks Construction

MANUFACTURERS OF

Wire-Wound Stave Pipe and Continuous Stave Pipe

Agents for Waterworks Supplies - VANCOUVER, B. C.



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We are pioneers in the manufacture of "Crimped Round Wire Work" and have a separate department for this branch.

Send us your inquiries for

Wire Window Guards and Wire Work of all kinds, in Round or Channel Iron Frames.

BEST WORK QUICK DELIVERIES

DENNIS WIRE & IRON WORKS CO.
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LONDON - - TORONTO

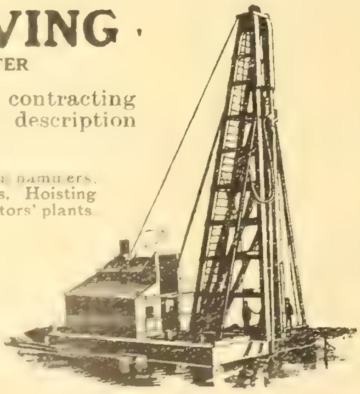
Veneered Doors

Newel Posts
Staved Columns
Rails and Balusters
Pedestals
Sash
Door and Window Trim
Pine Doors
Interior Finish

Our success is due to the careful working out of, and attention to, details

Write for our prices which will be sure to be satisfactory

BATTS LIMITED
50 Pacific Avenue - - West Toronto



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LAND OR WATER

Pile Driving and general contracting concrete work of every description

FOR RENT

Pile Drivers, Drop and Steam hammers, Concrete Mixers, Derricks, Hoisting Engines, and other Contractors' plants

Lincoln Construction Co.
Office: 64 Niagara St.
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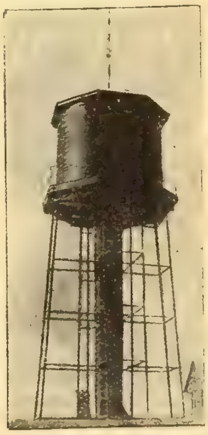

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Suitable for Sprinkler Systems Fire Protection, Water Supply Plants, etc.

Steel Substructures of all kinds
(Galvanized or Painted)

Windmills, Gasoline Engines, Hydraulic Rams, Etc.

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Limited
TORONTO and WINNIPEG

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is made quite differently to any other stone. Don't be deceived by the old just-as-good story. :: ::

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505 Temple Building
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CRUSHED STONE

All Sizes

¶ For Roadways and Sidewalks also specially adapted for

Reinforced
Concrete
Construction

¶ Our arrangement with C.P.R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

Phone Main 5377 or Write

Christie, Henderson & Co.
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Head Office: 34 Yonge Street, TORONTO

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Manufacturers of the well-known

TRIDENT
Frost-Proof
Water
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Main Office - 90 West Street
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Corinthian Stone

can be supplied in any size, shape or quantity

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can only be procured from, and is manufactured solely by the

Corinthian Stone
Company, Guelph

from the hardest substances available

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Corinthian Stone
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G. T. R. Junction, Guelph

Prices are Low — Quality is High

Sand and Gravel

Lime
Cement
Plaster
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Fire Clay
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Sewer Pipe
Weeping Tile

Our prices are right and our service good.

Britnell & Co., Limited
C.P.R. Crossing, Yonge St., North Toronto
Phones, Office North {604 605 Evenings, North 2107

Builders' and Contractors' Supplies

Portland Cement, Lafarge Cement, Gravel, Sand, Rubble, Imported and Canadian Pressed Brick for front work and fireplaces.
CRUSHED STONE—Dimension and Coursing Stone, Lime
FIRE BRICK **IVORY CEMENT PLASTER**

—Yards—
75 Brock Ave., Jarvis Street Wharf,
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The Consolidated Stone Company

Quarries and Mills at Bedford, Indiana, and Bloomington, Indiana

Producers of Dark Hollow Buff and Blue
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The Celebrated

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from our quarries has been used in many of the largest public buildings, churches, etc., in the United States and Canada.
Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

General Offices
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Western Canada Provides a Rich Market

for building, construction and engineering supplies of all kinds. The WESTERN CANADA CONTRACTOR is the only publication west of the Great Lakes devoted to the interests of architects, engineers, contractors builders, etc.

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Western Canada Contractor
Commercial Travellers Building - Winnipeg

House Trim, Doors, Etc.
in
Chestnut, Pine, Hardwood

Our prices are based upon small profits and always represent full value. Small orders at low prices are invited.

The Tillson Company
Limited
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The
Willson Portable Flare Light

Good contractors know that it always pays to get the best appliances.
The Willison Portable Flare Light, which is specially adapted for use in all kinds of construction work, cannot be beaten in efficiency or cost. Think of it, this light gives a candle power of 8,000 at a cost of less than six cents an hour.

International Marine & Signal Co.
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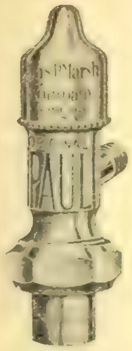
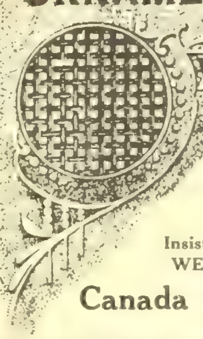


The Original
MARSH-PAUL AIR VALVE
Guaranteed for Five Years

Our Air Valve Catalog describes this Valve and others of our manufacture — also Pressure and Steam Gauges.

Write to-day

Jas. P. Marsh & Co., 224 Washington St. CHICAGO, ILL.
Established 1865



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WIRE CLOTH AND WIRE GOODS

Do not overlook the protection of your windows and security insured by installing our
WINDOW GUARDS
Insist on having HARD STEEL WIRE
WE SOLICIT YOUR ENQUIRIES

Canada Wire Goods Mfg. Co.
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How is business built up and reputation acquired?

Every Architect and Contractor must answer that question in the most practical way.

The degree of **his** success **depends** altogether on **the service rendered** and the **goods specified** or **recommended.**

There's no escaping **that** conclusion.

Naturally, we believe **International Varnish Products** are the best of their class you **can** specify or recommend.

Prejudiced we may be, but we have logical reasons for the faith that is in us.

You see we have been manufacturing varnishes, enamels, stains and finshes for over forty years.

We have worked hard and spent money like water to perfect our products.

And **many** prominent Architects and Contractors **declare** that **we have succeeded splendidly.**

We do not ask you to take our word.

Send us your name and address and we'll mail you a nickle steel bound book that actually shows things.

When you specify or recommend International Products you practically take out a policy insuring success. The quality of the goods is known and—

International Products are always sold in Full Imperial Measure Cans.

International Varnish Co., Limited
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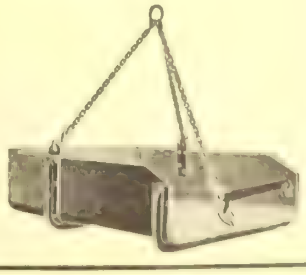
Dredges - Ditchers - Derricks
Steam Shovels
Steel Dump and Deck Scows

Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery



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"Galt" Art Metal Ceilings are sold strictly on their merits, their **mechanical superioity** and faithfulness to art in styles they typify.

Machine-cut beads (patented process) make them easy to apply. Plates snap into place and seams fit snugly together. Why waste your time puttying and peening the joints on old-fashioned stuff when the new is here and costs less?

Write us about your Metal Ceiling work

THE GALT ART METAL CO.,
GALT - ONT.

Herringbone Sherardized Lath

is the latest metal lath development. The zinc used in Sherardizing is deposited **within** the steel as well as **upon** it.

Weight for weight the zinc thus used is fifteen times more efficient than the zinc used in hot galvanizing process.

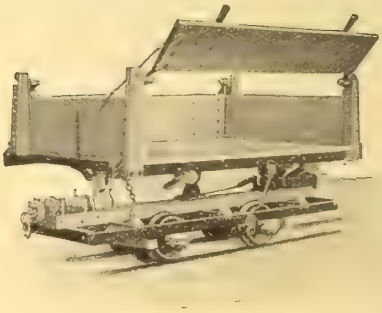
The cost of Sherardizing lath is less than the cost of even the poorest galvanizing treatment. The result is better than the best galvanizing.

Complete Information Sent On Request

CLARENCE W. NOBLE
GENERAL SALES AGENT
117 HOME LIFE BUILDING - TORONTO, ONT.
The Metal Shingle & Siding Co., Manufacturers

The
Meaford Wheelbarrow Co.
Limited
MEAFORD, ONTARIO

Manufacturers of Contractors' Supplies, etc.



WHEEL SCRAPERS—Pressed Bowl and Square Box.

DRAG SCRAPERS—Pressed Steel, Handles on top or sides, with or without runners.

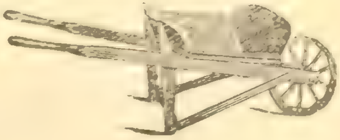
DUMP CARS, GRADING PLOUGHS

STERLING line of Roller Bearing, Easy Pushing Wheelbarrows and Concrete Carts.

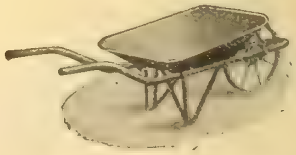
WHEELBARROWS of every description, both in steel and wood

TIMBER DOLLIES, TRUCKS of all kinds.

ASK FOR OUR CATALOGUE



SELLING AGENTS:
Alexander Gibb, 13 St. John Street, Montreal.
Bissett & Louchs, Ltd.. 151 Notre Ave. E. Winnipeg, Man
John Burns, 313 Water Street, Vancouver.



Mather & Platt

Turbine Pumps

High and Low Lift

These pumps have attained a world wide reputation for their excellence of design, high efficiency and ability to operate continuously for long periods, and under the severest conditions.

Single and Multi-Stage

Direct or Belt Drive

Manufactured for use throughout the Dominion of Canada by

Canada Foundry Co., Limited

Head Office and Works: TORONTO

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Right Here in Canada

Architects and Contractors can obtain marble with all the richness and depth of color that is to be found in the finest imported product.

Missisquoi Marble

is quarried in six distinct varieties which afford excellent opportunities for following out beautiful color schemes.

Light Grey
Dark Grey
Green Grey
Cream with Green Vein
Cream with Mottled Green
Cloudy Green and Pink

The Missisquoi Marble Co., Limited

Philipsburg, Quebec **Coristine Building, Montreal**

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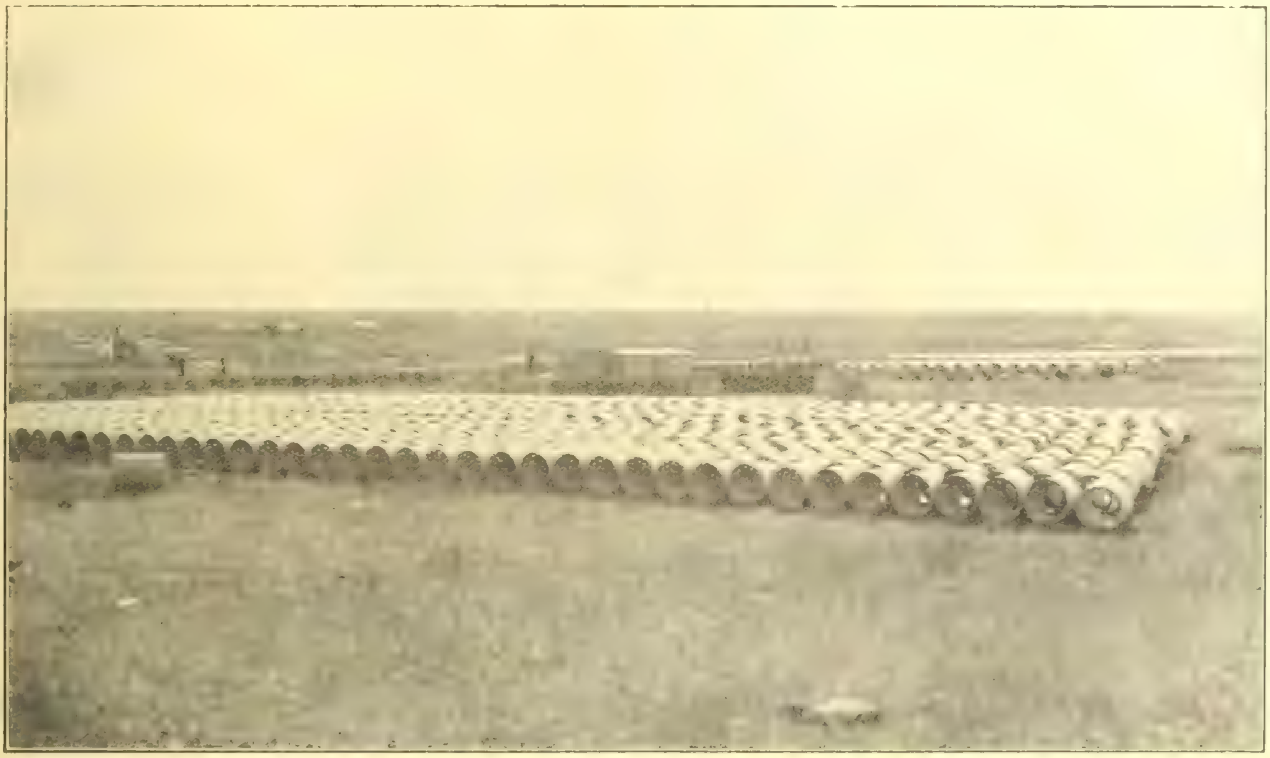
GENERAL CONTRACTORS' SUPPLY CO., HALIFAX.

Meriwether System

Continuous Re-inforced

Concrete Pipe

Patented



48 Inch Pipe Yard at Regina, Sask.

45 inch and 42 inch Pipe for Brantford, Ontario

Lock Joint Pipe Co.

165 Broadway - NEW YORK CITY

Write for Illustrated Catalog

WINNIPEG, MAN.—F. H. McGavin Co., Ltd.
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LOUISVILLE, KY.—Harris Engineering Co.
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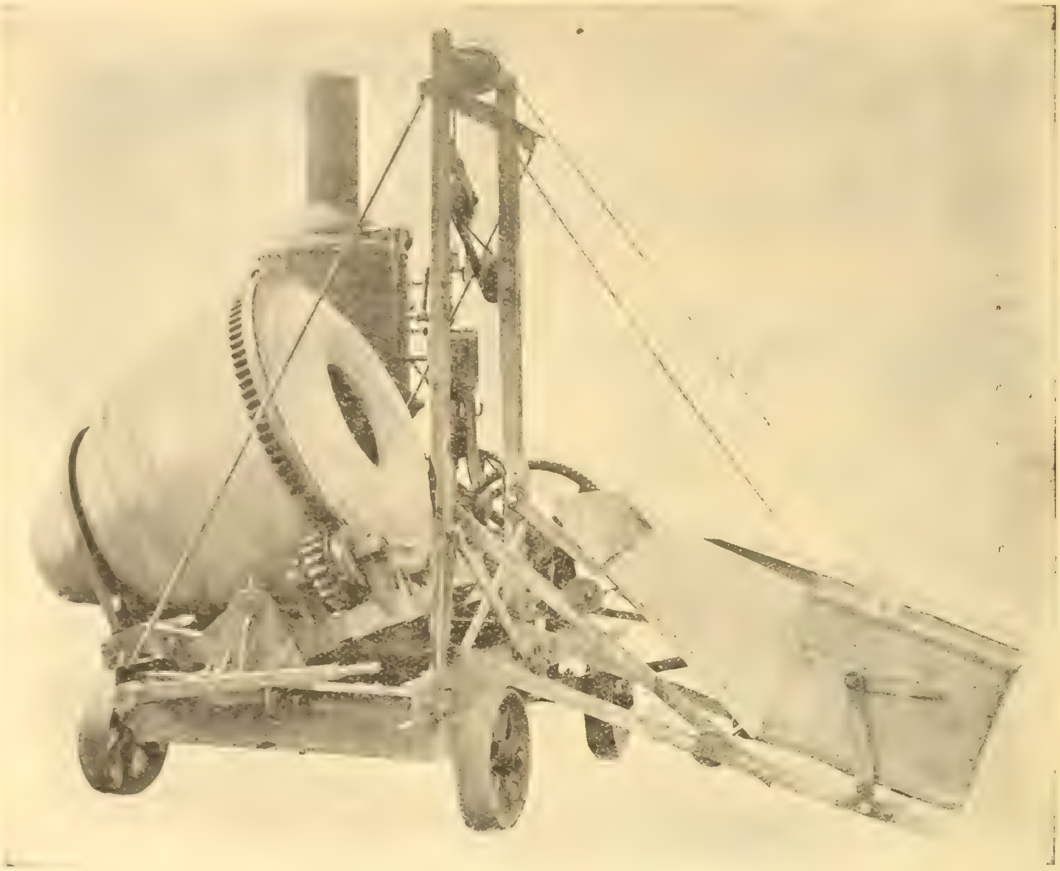

OUR NEW

Half-Yard

Heart-Shaped Mixer

was used in connection with some of the largest contracts during the past season.

It was endorsed and used by the Hydro-Electric Commission for their concrete poles and abutment work.

The frame is all steel. It is strong and compact and can be equipped with any power desired.

Wettlaufer Bros.

178 Spadina Ave.
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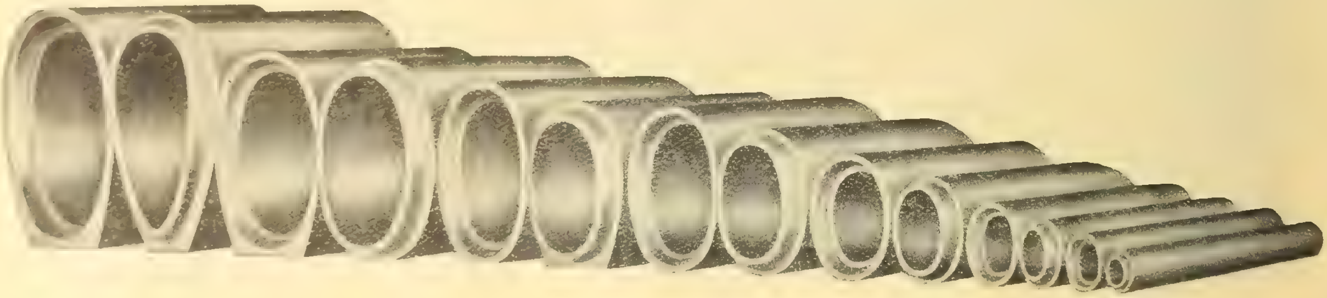

We Guarantee Our

Reinforced Concrete Pipe

for Culverts and Sewers

"Long Service at Low Cost"

Our Pipe is **frost-proof, indestructible** and **everlasting.** It is easily handled, easily placed, and easily procured. It has been approved by **most particular, most renowned, most experienced,** and **most skilled engineers.**

Stock sizes 6 inch to 48 inch. Other sizes to order. Write for catalogue and prices

Dominion Concrete Company, Limited

KEMPTVILLE - ONTARIO

For

Fire and Furnace Purposes

there are no better bricks than

GLENBOIG or GARTCOSH

Brands

For Building Purposes

where a pleasing appearance is desired, on account of their color, they have been and are largely used

STOCKS carried by all principal dealers

MAKER'S SELLING AGENT

Alexander Gibb, 13 St. John St.
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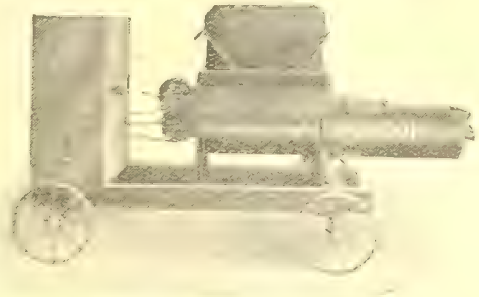
London Automatic Batch Concrete Mixers



Made in two sizes

No. 1 capacity 50 yards per day
No. 2 " 150 " "

Will Save you Money
- On the first cost of machine
- On cost of operation
- On cost of mixing concrete

Our Automatic Machines do **perfect measuring** and **mixing** with **any kind of material, measure any proportion,** and give **any consistency of moisture.** Materials only handled once. **Less men required to operate.** Send for catalogue and state capacity desired.

We also manufacture a Standard Drum Batch Mixer in three sizes, one-third yard, one-half yard and one yard. The most complete Drum Mixer [illegible] We have everything in the line of Concrete Machinery and Cement Working Tools. Tell us your requirements.

The London Concrete Machinery Company
19 Marmora Street, London, Canada Limited

Manitoba Branch:
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52½ Princess St.,
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Agents for Montreal: Lemarre Bros., 323 Hibernia Rd., Montreal, Que.
We are the Largest Manufacturers of Concrete Machinery in Canada.

Pine Doors

The kind that don't sag and warp

We have equipped our factory with the latest door making Machinery and are able to turn out doors not only of the best quality but at the right price.

Prompt Deliveries **Write for prices**

L. A. Delaplante Co.

Limited
Head Office (Manning Arcade)
24 King St. W. Phone Main 5912 **TORONTO**
Planing Mills, East Toronto - Phone Beach, 230

"Empire Brand"

ensures a perfectly smooth hardwood floor which will be "a thing of beauty and a joy forever." If you want your clients to speak of you as "a fellow who always uses the best materials obtainable," specify

"Empire" Brand

every time.

J. R. Eaton & Sons

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Montreal Agent:
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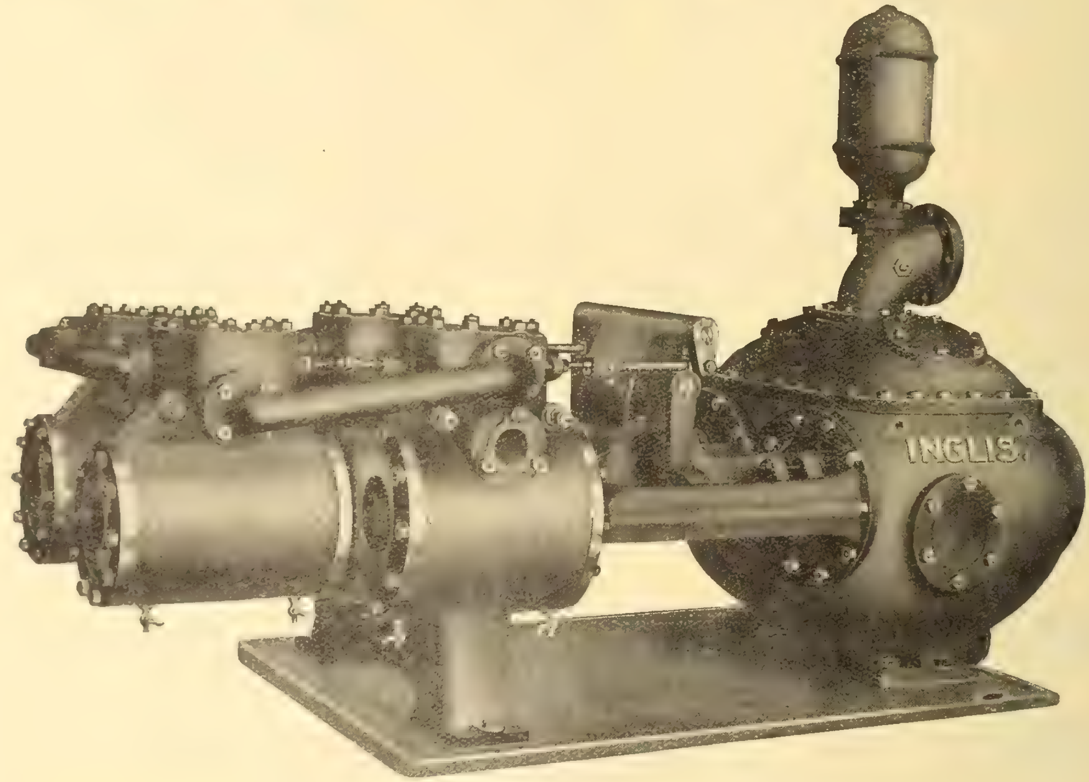
PUMPING MACHINERY



Compound Duplex Direct Acting Pumping Engine

We build Pumping machinery of all kinds and for all requirements. Experience should be considered when installing a pumping plant. We have built a great many throughout Canada and will gladly refer any corporation who are prospective purchasers to cities, where our pumps are operating and giving entire satisfaction. Built in sizes from one to thirty million gallons per twenty four hours.

Write us for photos and particulars.

The John Inglis Company Limited

ENGINEERS AND BOILERMAKERS

14 Strachan Avenue - TORONTO, CANADA

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Burnaby, B.C.

Tenders addressed to C. T. Saunders, C.M.C., will be received until January 9th for construction of waterworks system for D. L. 186. Tenders to quote lump sum of alternatively separate tenders as follows: (1)Price of valves and other fittings. (2) Supply of approximately 31,000 feet of 4, 6, 8 and 10-inch pipe; laying of pipe and fittings. Plans, etc., at engineer's office, Municipal Hall, Edmonds, and at Messrs. Kilmer & Holland's office, 524 Pender street, Vancouver.

Fergus, Ont.

The by-law to issue debentures for permanent sidewalks was carried.

Goderich, Ont.

The by-law to raise $26,000 by debentures for the building of a storm sewer was carried.

Harriston, Ont.

The by-law for a muincipal waterworks was carried.

Meaford, Ont.

The by-law to raise $10,000 for street repairs was defeated.

North Vancouver, B.C.

It is stated that a sum of approximately $40,000 will be expended by the city during the coming season in the purchase of cast iron pipe, this to be in future exten-

Pembroke, Ont.

The time for receiving tenders for supply of riveted or lapwelded steel piping for waterworks here has been extended to January 16th; also that for delivery of cast iron water main. A. E. Fortier, town clerk, this town; T. Aird Murray, consulting engineer, Toronto; A. E. Dunlop, chairman Water Committee.

St. Catharines, Ont.

The by-law to expend $180,000 for a new water main to increase the pressure and supply was carried.

Toronto, Ont.

The storm overflow sewer by-law was carried; also the good roads by-law.

Vancouver, B.C.

Tenders will be received by the city clerk, Vancouver, B.C., for a road roller. For further particulars see advertisement in "Tenders and for Sale Department" of this issue.

Victoria, B.C.

In the by-law which provides an expenditure of 1,500,000 on the Sooke Lake project and which will be submitted to the ratepayers on January 17th, a clause was inserted making it compulsory to have the work done by contract.

AWARDED.

New Westminster, B.C.

The contract for paving and regrading the Columbia street extension from Fourth street to Leopold place, will be done by the Hassam Paving Company.

Ottawa, Ont.

The city council awarded the contract for the two lifts for the waterworks to D. Round & Sons, of Cleveland, Ohio. They are two ton lifts and the price is $185 each. The tender to the General Supply Company was second lowest, $204 each.

Victoria, B.C.

The contract with the Worswick Paving Company for the paving of Langley street, between Yates street and Bastion street, has been signed by the city and work will commence at once.

Railroads, Bridges and Wharves

Charlottetown, P.E.I.

Tenders are being called by department of public works until January 6th for rebuidling Sutherland's bridge at Montague; also Poole's mill dam bridge; also Paynter's bridge. L. B. McMillan secretary.

Edmonton, Alta.

One of the debenture by-laws to be voted on by the ratepayers on January 22nd includes $167,000 for another bridge over the Saskatchewan.

Fredericton, N.B

The Pinder mill bridge, in Southampton, York county, is to be rebuilt, and the provincial department of public works is calling for tenders for the work.

Montreal, Que.

Capitalized at thirty million dollars, the Montreal Central Terminal Company proposes to tunnel the St. Lawrence and erect a central terminal station for all the railway lines entering Montreal with the exception of the C.P.R. Their plan, which includes the abolition of all level crossings, has been laid before the Board of Control.

Owen Sound, Ont.

The by-laws to rebuild two bridges were carried.

Port Burwell, Ont.

Tenders addressed to R. C. Desrochers, Department of Public Works, Ottawa, will be received until January 30th for construction of breakwater here. Plans, etc., at above Department and at the offices of district engineers, Toronto, London, and on application to local postmaster.

Toronto, Ont.

The by-law to improve Ashbridge's Bay was carried.

Public Buildings, Churches Schools, etc.

Brantford, Ont.

By-laws to dispose of the fire hall and old Waterous property sites on Dalhousie street, on which the proposed new Government buildings were to be erected, were defeated.

Calgary, Alta.

The present site of Knox church, Seventh avenue and Centre street, has been sold. The congregation is now considering the erection of a church on Sixth avenue and Second street. Estimated expenditure, $100,000.

The present site of the First Baptist church on First street west and Seventh avenue has been sold. Plans are to be prepared immediately for a new church for which a site on southwest corner of Thirteenth avenue and Fourth street west has been purchased. The deal was put through by J. K. Lee, of this city.

Collingwood, Ont.

The by-law for new west end public school and town fire hall with up-to-date equipment was carried.

Edmonton, Alta.

Debenture by-laws totalling $456,000 will be voted by the ratepayers on January 22nd. They include $175,000 for a stock pavilion at the exhibition grounds, and $90,000 for the purchase of industrial sites.

Fergus, Ont.

Tenders addressed to R. C. Desrochers, secretary, will be received until January 18th for postoffice fittings. Plans, etc., on application to Wm. Mahoney, architect, Guelph, and at the Department of Public Works.

Foldens, Ont.

Tenders addressed to C. W. Budd, secretary, will be received until January 15th for erection of brick church here. Plans, etc., with Wm. Pullin, chairman, or with the above. Advertisement in "Contract Record."

Guelph, Ont.

At a joint meeting of the Winter Fair board and council it was decided to have an architect draw up plans regarding the additional accommodation required for the fair. Several proposals were submitted, but no action was taken. A meeting will be held on or about January 15th.

Goderich, Ont.

The [illegible] towards building new municipal buildings was carried.

Hamilton, Ont.

The by-law for hospital site and Children's Detention Home were carried.

Hillsboro, N.B.

Tenders addressed to [illegible], chairman of building committee, will be received until January 6th for contsruction of the First Hillsboro Baptist church. Plans, etc., at office of above and at office of H. H. Mott, architect, [illegible] St. John.

Kamloops, B.C.

Plans are being prepared for the erection of new hospital here [illegible] architect. Noted in issue of December 21.

Kingsmill, Ont.
The by-law for a library was carried.

Montreal, Que.
Messrs. Ballen, Day, Evans and others, of Mount Royal Vale, were appointed a committee to report on the erection of a new Anglican church here.

Application is being made to the Quebec legislature by the churchwardens of St. Mathias' Church, Westmount, for an act authorizing them to borrow money upon the security of the church for the legislature by the erection of church and other buildings for the ecclesiastical and parochial uses of the parish.

Ottawa, Ont.
It is understood that negotiations are about completed whereby the English-speaking Lutheran church congregation in this city has purchased a site on Lisgar street near O'connor on which it will erect a church in the very near future. Rev. Mr. Bieber is minister.

Owen Sound, Ont.
The by-law to erect a Carnegie library was carried.

Quebec, Que.
The Nickel Theatre on St. Ann street was damaged to the extent of about $25,000 on the 25th ulto.

Sault Ste. Marie, Ont.
The by-law for schools was carried.

Sherbrooke, Que.
We are informed that the contracts for erection of monastery at Sherbrooke have not been awarded. Materials, stone and brick; estimated cost of building, $75,000. Architect, P. Girard.

South Vancouver, B.C.
A new church will be erected shortly in St. Mary's parish.

Plans have been completed by Engineer Harvey for the Emergency Hospital on corner of Thirty-sixth avenue and Prince Edward street. Plans are yet to be approved by council.

St. John, N.B.
Mrs. J. C. Jordan has given to the province her summer home at River Glade as a sanitarium. It is understood that Mrs. Jordan proposes to build a large hall and library also.

Toronto, Ont.
The Western Hospital by-law was carried.

Building permits were issued to Board of Education for 2-storey brick addition to school on Avenue road, $40,000; Methodist Church, 2-storey stone Sunday School on St. Clair avenue, $30,000.

Vancouver, B.C.
Tenders addressed to Wm. McQueen, city clerk, were received until December 30th for construction of isolation hospital near Barnet, including heating. Plans, etc., at office of Messrs. Dalton & Eveleigh, architects, 615 Hastings street west. Tenders to furnish figures on cement foundation and stone foundation. Owing to the tenders called before being too high, new plans have been prepared.

Victoria, B.C.
The council finally decided to submit the theatre by-law to the ratepayers on January 12th.

Tenders are invited by the department of public works for the erection of a small one-room schoolhouse at Oyama, in the Okanagan district, tenders to be received on or before the 20th January.

The ratepayers will vote on the erection of a new theatre here at an estimated expenditure of about $100,000. A company headed by Mr. Simon Leiser represents the company interested, and Alderman Mabie is on the committee appointed by the city council to look after the city's interests.

Weston, Ont.
The high school by-law asking permission to purchase a site for a new high school was defeated. The by-law for an addition to the public school was carried.

Whitby, Ont.
The ratepayers voted down the proposal to expend $25,000 on new collegiate.

Windsor, Ont.
The by-law to provide $6,000 for new fire hall in west end of the city was defeated.

Winniueg, Man.
The board of control decided to advertise the programme for competitive plans for an infectious disease hospital to cost $200,000, despite the fact that only $75,000 of the money is as yet available. The advertisement is to be conditional upon the procuring of the rest of the money needed. Special legislation to carry on the work will be asked from the government this winter, and it is probable that authority will be given to place the additional amount in next year's general tax levy.

AWARDED.

Brockville, Ont.
F. Clow was given the contract for the repairs to the Victoria building, necessitated by the recent explosion. Five bulk tenders were received.

Residences

Cobalt, Ont.
The residence formerly occupied by Mr. Robbins was destroyed by fire on the 27th ulto. Loss, about $4,000.

Nelson, B.C.
Alex. Carrie is advertising for tenders for quarrying rock on the lots on Victoria street, where Edward Kerr proposes to build a modern apartment house.

Ottawa, Ont.
M. C. Edey is preparing plans for tenements for B. Barwick and Mrs. Barrett.

Business Buildings, and Industrial Plants

Aurora, Ont.
Tenders are being called until January 6th for erection of two-storey and basement factory for J. Fleury's Sons. O. E. Tench, architect, Newmarket. For further information see "Tenders and For Sale Department," this issue.

Calgary, Alta.
Dr. Lindsay is reported to have purchased the Knox church site on Seventh avenue on which he will erect a large business block.

Chatham, Ont.
The by-law to grant the Western Bridge & Equipment Company a site for an enlarged factory was carried.

Dresden, Ont.
The heaviest losers in the fire which occurred here on the 25th ulto. were C. B. Watson, owner of buildings, and R. Aiken. Estimated loss, about $100,000.

Edmonds, B.C.
The B.C.E.R. Company will erect in the near future a new station similar to the one at Chilliwack. A Purvis, mgr., Mr. B. G. Walker, president of the Board of Trade.

Elora, Ont.
The by-law to exempt the Bissell foundry from taxation for ten years was defeated.

Fort Frances, Ont.
The by-law for the assessment of the Shevlin Clarke Lumber Company carried.

Glace Bay, N.S.
The building owned by the Harris Abattoir Co. was destroyed by fire.

Hamilton, Ton.
It is reported that 1,500 acres of land on the Grand river, between Dunnville and Port Maitland, are being purchased for the United States Steel Corporation.

Iberville, Que.
The Norcroos Bros.' stone-dressing plant was destroyed by fire on the 2t7h ulto. Loss, about $30,000. Mr. Perry manager.

Latchford, Ont.
Loss by fire on the 24th ulto. to the extent of about $100,000 was sustained by Latchford Hardware Company, A. Abdalah, P. Curtis, and others.

Masson, Que.
It is stated that Senator W. C. Edwards is rebuilding on a larger scale the large flour mill recently destroyed by fire. E. A. Barry, of Montreal, is in charge.

Moose Jaw, Sask.
The Western Manufacturing Company, of Regina, are stated to have purchased the plant of the Saskatchewan Sash & Door Company, here, which they will replace by a large and up-to-date plant.

Montreal, Que.
The building occupied by the Anglo-Canadian Leather Co. was damaged to the extent of about $200,000 on the 27th ulto.

The building occupied by Freeman's Company has been purchased and it is understood that this will be replaced by a modern ten-storey office building.

North Battleford, Man.
C. B. Ramsay and J. Roberts have purchased the Grand Central Hotel, which they propose renovating at once. An addition will probably be built in the spring.

Orillia, Ont.
The by-law granting certain privileges to the Canada Refining & Smelting Co. was carried; that for loan of $12,000 to the National Hardware Company, defeated.

Ottawa, Ont.
M. C. Edey is preparing plans for a three-storey commercial building on Gladstone avenue near Bank, for H. Levin.

A permit has been issued to the Ottawa Electric Railway Company for a concrete addition to its power house on Middle street, $7,000.

Owen Sound, Ont.
The planing mill now operated in Chatsworth will be operated in the future in Owen Sound. Those interested are W. Bumstead, of Owen Sound; Wm. Arthur, Woodford; Dr. J. Airth, Chatsworth, and former Manager Galbraith, Chatsworth.

Peterborough, Ont.

Messrs. J. J. Turner & Sons will enlarge their factory here. John Belcher, C.E., has been instructed to prepare plans.

The by-law to authorize a loan of $12,000 and exemption to the Bonner Worth Company was carried, but possibly not large enough to meet the requirements of the three-fifths.

Petrolea, Ont.

The by-law to give exemption to a canning factory was carried.

Princeton, B.C.

C. R. Briggs, is secretary for the British Columbia Portland Cement Company, Ltd., Vancouver, for whom a cement plant and storage house is being erected here. Size, ground floor, 50x450. Address of Secretary, Room 11, Davis Chambers, 615 Hastings West, Vancouver.

Strathcona, Alta.

The warehouses and workshops of the O'Brien Company, until recently the O'Brien-Dale Lumber Company, will be enlarged. The transfer of this business to the Pigeon Lake Lumber Co., of which P. J. Mullen, lately of Millet, will take place shortly.

Stettler, Alta.

Stettler iron works, owned and occupied by John Finchman, were badly damaged on the 26th ulto.

St. Catharines, Ont.

The by-law to make a fixed assessment on the Kinleith Paper Mills and Warren Bros. knitting factory was defeated.

St John, N.B.

Joseph E. Clarkson, manager of the Edward Partington Pulp & Paper Company, has left for England. It is expected on his return an announcement will be made respecting the project for the erection of an up-to-date mill.

Toronto, Ont.

The St. Nicholas' Home for Boys on Lombard street has been sold. It is stated that a factory will be erected on the site.

Vancouver, B.C.

Permits were issued for six-storey business block, Seymour street, to T. A. Fee, $115,000; also to Smith, Davidson & Wright, for 4-storey warehouse, $75,000.

Plans have been submitted by Messrs. Smith, Davidson & Wright for the erection of a four-storey warehouse at the corner of Homer and Davie streets. It will be 80 by 100 feet and will cost $80,000.

The Merchants Bank of Canada has purchased the corner of Granville and Pender streets, where a large business building of about eight storeys will be erected. Mr. Geo. S. Harrison, manager of the Vancouver branch.

W. M. Dodd & Co., Canadian Bank of Commerce Chambers, Hasting street, are the architects for the new 10 storey fireproof hotel to be erected on the corner of Robson and Hornby streets for Passlin building syndicate, Dominion Trust building. The latter will erect at once, it is stated, at a cost of $35,000, a four-storey brick and stone building on Richards street. Contractors, S. Hovick & Co., Vancouver; architects, W. M. Dodd & Co.

Victoria, B.C.

The Standard Laundry Company will erect an extensive addition to its View street building, $9,000.

Tenders were called until December 27th for concrete foundation, etc., for a building by S. Maclure, 19 Green block.

Whitby, Ont.

The proposal to accept $4,150 a year from the Bell Company for a 5-year extension of their franchise was defeated.

Winnipeg, Man.

It is rumored that options were secured on two Main street sites for the projected hotel by the Ritz-Carlton Syndicate of New York.

The Donald Fraser building, here, was destroyed by fire on the 26th ulto. Total loss, about $150,000. Owner, Rt. Hon. A. J. Balfour. Damage to the extent of about $20,000 was also done to the Overland Furniture Co.'s plant.

AWARDED.

Brantford, Ont.

E. G. M. Cape, Montreal Que., has charge of the erection of the extension to Waterous Engine Works, here. Estimated cost, $40,000.

Charlottetown, P.E.I.

The contract for erection of branch for Royal Bank of Canada has been awarded to H. & S. Lowe, this city, $20,000. Kenneth G. Rea, architect, Montreal, Que.

Ottawa, Ont.

Pedlar People, of this city, have been awarded the contract for metal lath and furring for the Rosenthal building. C. E. Deakin, general contractor. A. L. Weeks, architect.

The Linden British Refrigeration Co. has been awarded the contract for the cork boarding and refrigeration installations for the George Matthews building. W. E. Noffke, architect.

Port Arthur, Ont.

R. Hamer has been awarded the contract by the Dominion government for the construction of a fish hatchery in the mouth of the Current river, here, $5,000.

Power Plants, Electricity and Telephones

Bowmanville, Ont.

The plebiscite in favor of the electric light being managed by commissioners carried.

The by-law to grant a franchise to the Seymour Power & Electric Company, Limited, was carried.

Brockville, Ont.

The by-law to amalgamate the Light and Water Commissioners carried.

Elko, B.C.

The B. C. Electric Company will apply for the right to use five hundred second feet of water from the Elk river near Elko. There is a head of 175 feet, and that volume of water will produce a large current for use in the near future.

Fergus, Ont.

The People's Railway by-law to invest $20,000 in a preferred stock at 6 per cent. for the town carried. The by-law to grant the People's Railway a franchise carried.

Guelph, Ont.

Guelph voted for the by-law to extend the radial railway into St. Patrick's Ward.

Hespeler, Ont.

The by-law to raise $4,000 for the extension of the electric light for street lighting was carried.

Kingston, Ont.

The by-laws for electric light improvements and for the extension of Barrie St. were carried.

Listowel, Ont.

The by-law to raise $5,000 to complete the electric light system was carried.

Niagara Falls, Ont.

Stamford Township ratepayers voted down the by-law to grant the Niagara Falls, Welland and Dunnville Railway right of way through the township.

Ottawa, Ont.

The Morrisburg & Ottawa Railway and the Ottawa Electric Railway are in negotiation to co-operate. The proposal is for the Morrisburg & Ottawa to enter the city in Ottawa East and the city street railway extend its line to meet it at a station there.

St. John, N.B.

The Maine & New Brunswick Electrical Power Company is making arrangements to build a power line from its plant at Aroonstook Falls to Limestone, Van Buren and St. Leonards, running near Grand Falls. The object is to sell electrical power for lights and motors in the towns reached, also to furnish electrical power for the construction work during the establishment of a power plant on the St. John river at Grand Falls, which, it is understood, will soon be built by a company which has recently gained control of it.

Toronto, Ont.

The street railway extension by-law was carried.

Waterloo, Ont.

Waterloo voted to raise $40,000 for electric light purposes.

The by-law to raise $40,000 for electric light purposes was carried.

Victoria, B.C.

The council have decided to ask the ratepayers to vote on the underground telephone and electric lighting by-laws on the 12th of January.

Winnipeg, Man.

Tenders addressed to chairman, board of control, will be received until January 12th for manufacture, delivery and erection of one stop log winch at Point du Bois. Specification, etc., with power engineers, Carnegie Library.

Miscellaneous

Bradwardine, Man.

In the recent fire the Bank of Hamilton's branch here was burned.

Edmonton, Alta.

On First street, the buildings projected within the coming year are: Adams Bros., wholesale saddlery building, five storeys, $75,000, northwest corner First and Athabasca; R. Tegler, six-storey departmental store block, $100,000, southeast corner First and Elizabeth; Crafts, Lee & Gallinger, northwest corner of First and Peace, five-storey block, about $75,000; an Edmonton syndicate, ten storey block, opposite King Edward Hotel.

On Jasper avenue the blocks that are projected are the Masonic Temple, corner Sixth and Jasper, five-storeys; Dr. McLean, reported building on the corner of Eighth and Jasper, six storeys; P. McNaughton, apartment block, southwest corner Ninth and Jasper, $25,000; Hugh McDonald, business block, corner Fourth and

(Continued on page 31)

Tenders and For Sale Department

Tenders

Sealed tenders are asked (for all and part) [illegible], Foldens. Tenders open till JANUARY 14TH, 1911. For plans, etc., see Wm. Pullin (chairman), or O. W. Budd (secretary), Foldens, Ont. Bell phone service 49, ring [illegible]. Lowest tender not necessarily accepted.

WM. PULLIN,
Foldens, Ont.

Wanted

Wanted: Large American firm manufacturing waterproofing compounds, wants to secure Canadian representatives with good connection. Product is now widely used in United States and is an absolutely reliable and economical waterproofer of concrete and cement mortar. For full information write Box 178, CONTRACT RECORD, Toronto. 52-1

To Machinery Users

For 15 years we have handled both new and second-hand Machinery and Contractors' Equipment, and the name, Willis Shaw, is familiar to users of Machinery all over the United States.

We issue a printed list of our offerings with prices, sizes, etc. This we will cheerfully mail on request. We submit it with the assurance that we have investigated, inspected, or have reliable reports on every item in it.

We know how, and do protect the interests of our customers. Confer with us and get prompt service. Large Chicago stock to select from.

WILLIS SHAW MACHINERY CO.,
171 La Salle St., Chicago Ill.

Time Extension

The Town of Pembroke, Ontario

Tenders for

Cast Iron Water Main

Tenders are required by the 16TH JANUARY for the delivery of Cast Iron Water Main.

Prices to include for 16-inch diameter cast iron hub and spigot joints. Approximate length 5,900 feet. At least in 12-feet lengths, exclusive of socket. Pipes to be in accordance with the Canadian Society of Civil Engineers standard specifications for cast iron pipe and special castings. Class D. Tenders to specify price per foot and include delivery f.o.b. cars Pembroke.

Tenders to be sent in to Mr. E. A. Dunlop (Chairman of Water Committee, Pembroke).

The right is reserved to reject any or all tenders. Any tender will only be accepted on condition of entrance into a bond as to specification of quality and time limit for delivery.

Tenders to specify earliest possible delivery with limit period for completion of delivery.

By Order,
A. E. FORTIER,
Town Clerk, Pembroke.

T. AIRD MURRAY,
Consulting Engineer, Toronto. 52-52

To Building Contractors

Tenders are invited for the erection in Aurora, Ont., of a large two-storey and basement factory building, for J. Fleury's Sons.

Tenders in bulk or separately for excavating, concrete work and brickwork; carpentry, painting, gravel roofing and galvanized iron work. Prompt tenders are required.

The plans and specifications will be ready Friday, December 30th, and may be seen at the offices of J. Fleury's Sons, Aurora, and also at the Architect's office, Queen Street, Newmarket.

O. E. TENCH,
Architect.

1-1

Extension of Time

City of Regina

Tenders for Power Plant

Tenders are asked for by the City of Regina for the supply and installation of any or all of the following, together with the necessary connections ready for operation:

1 1500 k.w. Steam Turbine Generating Unit.
1 500 k.w. D.C. Generating Unit.
2 500 Horse Power Boilers.
1 Economizer.
1 Hand Power Travelling Crane.
1 Coal and Ash Conveyer.

Tenders will be received for the above until noon, TUESDAY, JANUARY 31, 1911. Specifications and all information will be furnished on application to the undersigned or to E. W. Bull, City Electrician.

(Signed) A. J. McPHERSON,
City Commissioner.

51-2

Time Extension

The Town of Pembroke, Ontario

Tenders Required for

Steel Tubes for Intake Pipe

Tenders are required by the 16TH JANUARY for either rivetted or lapwelded Steel Piping.

Prices to include for 18 inch diameter steel piping ¼ inch thick—approximate length 6,000 feet—cast Steel Flanges—Wood or other approved Gaskets—Approximate number fifteen Flexible Joints, Cast Iron Double Flanged Ball and Socket Joints.

Prices to include delivery f.o.b. cars Pembroke.

Tenders to specify price per foot for piping, including flanges, bolts and gaskets complete. For Flexible Joints, price per joint is to be specified. Tenders to specify earliest possible delivery with limit period for completion up to end of February, 1911.

Tenders to be sent in to Mr. E. A. Dunlop (Chairman of Water Committee, Pembroke).

The right is reserved to reject any or all tenders. Any tender will only be accepted on condition of entrance into a bond as to specification of quality and time limit for delivery.

By order,

T. AIRD MURRAY,
Consulting Engineer,
Toronto.

A. E. FORTIER,
Town Clerk,
Pembroke.

52-52

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

Agents Wanted

Agents wanted in all parts of Canada to handle wood preserving for Poles, Cross-Arms, Railroad Ties and Construction Timber. For particulars write W. D. Ward, Tribune Building, New York. 1-2

Wire cables for holding shaft timbers are used at the Fremont mine near Amador City, Cal. The shaft has two compartments, dips at an angle of 52 degrees, and is 650 feet deep with a 50-pound sump. In sinking this shaft some heavy ground that caved badly was encountered; the "Engineering and Mining Journal" states that it was impossible to get a bearing for the wall plates or caps, and the more the ground was trimmed away to secure a bearing for these timbers the worse it caved, until a large cavern was formed above the shaft. In order to timber the shaft through this ground, the expedient of securing the timbers in place with old hoisting cable was tried and proved quite successful. The sets in the caving zone were tied with the cable to those above which had firm bearings in the wall rock. This hanging of the timbers was continued until firm ground that would give sufficient bearing for the timbers was again encountered. Stringers were then placed over the suspended shaft sets and upon them a cribbing built up in the opening.

A concrete telegraph pole of the Siegwart type was recently tested at the factory in Lucerne in order to determine its resistance to bending, the load being applied at a distance of 4 inches from the top in order to secure loading similar to that to which the pole is subjected in practice. The pole was 26.24 feet long and its lower end was embedded horizontally for 4 feet in a masonry wall. The pole was hollow, about 10 inches in external diameter at the lower end and about 7½ inches at the upper end. The annular wall was 1.2 inch thick, reinforced with 32 ¼-inch round rods at the base, and wrapped with steel wire of small side. The deflection was measured by a scale at the end. According to "Beton und Eisen," the pull required to stress the steel to the permissible 14,200 pounds per square inch was computed as 409 pounds. The load was applied in increments of either 110 or 220 pounds, until it reached 550 pounds, when the deflection at the end was 2.2 inches. The load was then released to 0 and the set found to be 0.16 inch. It was again applied and raised to 1320 paunds, at which the deflection was 9.5 inches. Upon release the set was 1.9 inch. After raising the load to 1694 lbs., where the deflection was 17.9, and again releasing, the set amounted to 8.3 inches. The pole was finally broken under a load of 1958 pounds, failure occurring at the base. The first small cracks were noted on the tension side under a load of 1210 lbs., when the stress in the concrete was computed as 1970 pounds per square inch and in the steel 43,700 pounds.

Miscellaneous

(Continued from page 31)

Jasper, $55,000; Jackson Bros., three-storeys, on Wm. Sugarman property; Northern Investment agency, business block on Kelly and Moore property; J. B. Mercer, five-storey hotel, on Grand Central property, $100,000. This list does not include the proposed drill hall at $50,000, and the land titles office, which the provincial government will probably undertake within the next year.

Montreal, Que.

Tenders addressed to David Seath, secretary-treasurer Harbor Commissioners of Montreal, will be received until January 10th for supply of concrete and macadamizing stone. Specifications upon application to F. W. Cowie, chief engineer.

Port Hastings, N.S.

Tenders addressed to R. C. Desrochers, secretary, department of public works, Ottawa, will be received until January 11th for dredging here.

Prince Rupert, B.C.

Tenders will be received until March 2nd for $40,000, 20 year, 4½ per cent. telephone debentures; also $79,560 5 per cent. local improvement debentures. Ernest A. Woods, city clerk.

Regina, Sask.

The city council has decided to place an order with the Ottawa Car Company for four single and two double truck cars for the new municipal street railway under construction, to be delivered on or about July 5th, 1911.

Three Rivers, Que.

At a meeting between the promoters of the St. Maurice Valley Cotton Company and the city council of Three Rivers, it is expected that arrangements will be completed to build the new mills in Three Rivers. The organization involves a capital of three million dollars.

Toronto, Ont.

Permit was issued to Messrs. Ambrose Kent & Sons for addition to new 10-storey office building corner of Yonge & Richmond streets, $50,000.

Recent building permits include: Robt. Fasken, 2 pair semi-detached brick dwellings, on Margueretta, $10,000; Consumers' Gas Company, 1 storey brick governor house, on Eastern avenue, $14,000; W. H. Wright, 3 pair semi-detached 2 storey brick dwellings, Symington, $12,000; C. Coulter, 2 pair semi-detached, 2-storey brick dwellings, south-east corner Harbord and Jersey, $8,000; H. Freeman, 1 pair semi-detached 2½-storey brick dwellings, on Perth, $4,600; W. J. Bolus Co., 3-storey brick warehouse, on Victoria, $14,000; C. Garfunkel, 4 attached 3-storey brick stores and dwellings, on Roncesvalles, $14,000; T. Reid, 1 pair semi-detached 2-storey and attic brick dwellings, on Dufferin, $6,000; Mrs. A. M. Baird, 4 attached 2-storey brick and rough cast dwellings on Margueretta, $6,000; C. E. Lailey, 2-storey brick dwelling on Whitney avenue, $8,000; Whalen & Manuel, 1 pair semi-detached, 2½-storey brick dwellings, on Edna, $5,000; Jos. Yates, 2-storey brick dwelling on 12 Dalton, $4,500; Harvey Printing Co., 2-storey brick factory, Richmond, $8,000; A. Tate, 3 attached 2-storey roughcast dwellings, Westmoreland, $5,000; G. Brady & Son, 2 detached 2-storey and attic brick dwellings, on Woodlawn, $8,800; C. Banckham, 1 pair semi-detached 2-storey brick stores and dwellings, on Margueretta, $5,000; Walter Hudson, 2 detached 2-storey and attic brick dwellings, on Millicent, $5,000; C. P. R. Co., 1-storey brick freight shed, on West Toronto station grounds, $10,500;. C. E. Walton, 1 pair semi-detached 2-storey and attic brick dwellings, on 118-120 Winchester, $4,500; The Norcross Bros., 1-storey galvanized iron stone mill, on 355-367 Logan avenue, $5,000; Frank Merrill, 3-storey brick addition to factory, on Lombard street, $4,500; T. J. Allen, 3 attached 2-storey brick dwellings, on Ritchie avenue, $6,000; Mary S. Thompson, 3 attached 2-storey brick dwellings, on Clinton, $9,000; Lake Simcoe Ice Co., 1-storey galvanized iron ice house, on George street, $3,500; Marg. Wright, 2-storey and attic brick dwelling, on Westminster avenue, $3,500; J. Wanless & Son, 3-storey brick addition to office and apartments, corner Hayter and Yonge, $5,000; S. S. Prusky, 3-storey brick apartments, on William St., $9,000; S. J. Sharp, 1 pair semi-detached 2-storey brick dwellings, on Palmerston Gardens, $4,000; C. A. Boone, 1-storey brick storage warehouse, on 165 Richmond St. west, $4,500.

Vancouver, B.C.

Recent building permits include: A. Munn, 1330 Odlum drive, $2,500; A. E. Williams, 3026 Woodland drive, $3,500; J. C. Laidlaw, 166 Eleventh avenue west, $2,700; McColl & Saunders, 1957 Third avenue east, $2,500; Sam Kee, Hastings St., $4,500.

Victoria, B.C.

Following are the bids which have been received by the city for supplying the new equipment for the fire department authorized under the recent by-law: Two fire engines, Waterous Engine Company, $9,000; Aherns, Fox Fire Engine Company, $15,000. Motor hose wagons and motor combination chemical engine and hose wagon, Findlay, Durham & Brodie, $5,925; Woods Motor & Taxicab Company, combination, $6,700, hose wagons, $6,550. Hose: Vancouver Rubber Company, 95c. to $1.25 per foot, according to quality; Goodyear Rubber Company, $1 to $1.25 per foot; Canadian Rubber Company, 90c. to $1.10 per foot; Dunlop Tire & Rubber Company, $1 to $1.30 per foot. The W. E. Seagraves Company put in a lump tender for aerial truck, hose wagons and combination chemical engine and hose wagon of $19,983.

AWARDED.

Calgary, Alta.

The tenders for overhead material, feeders, etc., in connection with the street railway here were as follows: The Northwest Electric Company, Calgary, $3,672.89; the Northern Electric Company, Calgary, $1,526.69; the Canadian General Electric Co., Calgary, $4,275.40; Dawson & Company, $120; the Canadian West Company, Calgary, $208.50; Gorman, Clancy & Grindley, Calgary, $3,089.70; Canadian Equipment & Supply Company, Calgary, $107.40; J. W. Campbell (agent Phillips Wire Company), Calgary, $4,155.00.

New Companies

Robert W. Hunt & Co., Ltd., Montreal, capital $50,000, incorporated to carry on the business in all its branches of civil, mechanical, mining and electric engineers, etc. Incorporators, J. W. Moffat, civil and mining engineer; T. C. Irving, jr., civil engineer, both of Toronto, Ont.

J. H. McComb, Limited, Montreal, Que., capital [illegible], incorporated to manufacture, etc., roofing, flooring, paints, etc. Incorporators: S. W. Jacobs, K.C., A. R. Hall and Gui C. Papineau-Courture, advocates, all of Montreal, Que.

Montreal Paper Company, Limited, Portneuf, Que., capital $100,000, incorporated. Incorporators: Thomas B. Bishop, G. W. Bishop, both of Notre Dame de Portneuf.

Henry Gaffney, Limited, Toronto, Ont., capital $100,000, incorporated to operate sand and gravel pits, etc. Incorporators: H. Gaffney, builder; S. W. Field, barrister-at-law, both of Toronto.

Casey-Shaw Lumber Company, Limited, incorporated, Sudbury Ont., capital $50,000. Incorporators, E. L. Casey, Chicago, Ill., lumberman; Charles McCrea and George J. Valin, barristers-at-law, both of Sudbury.

National Bridge Company of Canada, Limited, Montreal, Que., capital $1,000,000. Incorporators: E. R. Parkins, C. G. Greenshields, advocates, both of Montreal, Que.

Canadian Rotary Machine Company, Limited, Montreal, Que. Capital $600,000, incorporated. Incorporators: G. V. Cousins, O. B. MacCallum, barristers, both of Montreal.

The Elder Ebano Asphalt Company, Limited, Montreal, Que., incorporated, capital $40,000. R. Brunet, contractor, J. G. Cartwright, office manager, both of Montreal.

Business Notes

John Marshall, builder, Toronto, is stated to have assigned.

Martin & Tremblay, plumbers, Montreal, are stated to have assigned.

Berthiaume & Campbeau, plumbers, Montreal, are stated to have dissolved.

Morency, Cote & Co., hardware merchants, Montreal, are stated to have assigned.

A mile-long boulevard is suggested by Alderman Prudholme, of Montreal, for Mount Royal Ward.

Central Construction Co., Ltd., Toronto, Ont. Petition is stated to have been filed for winding-up order.

The B.C. Gazette gives notice of the incorporation of the following companies: Western Engine & Supply Company Limited, capital, $25,000; Vancouver Sand & Gravel Co., Ltd., capital $20,000; British Columbia Building Trust Company, Limited; Koksilah Lumber Company, Limited, capital, $35,000.

Tenders are now receivable for the clearing of the right of way and subsequent construction of the first section of the Transcontinental line on Vancouver Island. Although no official announcement is made it is understood to be the intention of the railway authorities to open tenders and award the contract for construction of this section about New Year. It is further expected that despite the fact that the company's agreement with the government does not necessitate such expedition in procedure, the entire island section of the new transcontinental road from Victoria to Alberni—will be under contract before the close of 1911, and construction of that division giving access to the Pacific seaboard will be completed within three years from date. There is every reason to believe that even before the first link in the Canadian Northern Pacific system on Vancouver Island is completed an extension of powers will have been obtained and steps will have been taken for the further extension of the [illegible] by way of [illegible] to a point north of the [illegible], most probably at Quatsino Sound.

Canadian Railway Development

Good Progress Being Made By Contractors in Various Sections — Remarkable Growth of C. N. R.

The Grand Trunk Pacific Railway is perfecting plans for an early start on construction operations for its line to Grand Prairie. Engineers who have made preliminary examination of the country state that fewer engineering obstacles will be met with than on any other possible route, and that the territory to be opened up is most suitable for agriculture and stock raising. It is understood that the railway company has approached the Provincial Government seeking a bond guarantee for this road.

Official statement has been made that if nothing unforeseen happens the National Transcontinental Railway will be completed from Winnipeg to Moncton by the end of next year, with the exception of the connecting link of the Quebec bridge. Pending the completion of the bridge a car ferry service will be operated across the St. Lawrence.

T. C. Ross, of Victoria, B.C., is making good progress with his contract for clearing the right of way for the first five miles of the Cowichan Lake extension of the Esquimalt & Nanaimo Railway, H. J. Cambie, chief engineer, Victoria, B.C. About 50 men are employed and the work will be completed early next year.

It is now believed that the grading of the last 30-mile section of the Alberni branch of the Esquimalt & Nanaimo Railway, from the Little Qualicum river to Alberni, will be completed this month. The line will probably be in shape for tracklaying in February, and will be opened for traffic between Nanaimo and Alberni not later than April. Janse & McDonnel have the grading contract.

For 2,254 miles of the C.P.R. system the trains are handled entirely by telephone. It is expected that about 2,000 miles more of the line will be equipped during 1911. For the work two new copper wires are erected, each weighing 210 pounds per mile, and in the stations the very best apparatus to be obtained is installed. On all sections where there are telephone train-despatching circuits, every train, whether pasenger or freight, is equipped with a telephone set and a jointed pole, by which, in case of necessity, telephonic communication with the train despatcher for the district can be established almost immediately, and in the event of a train being stalled between stations, a great deal of delay in obtaining assistance is avoided. These train telephone sets are also used to a great extent by freight trains at sidings where there is no regular telegraph operator and frequently many hours delay to a freight train are saved. It is intended to have the whole line equipped ultimately with this system.

Contractors for several divisions of the National Transcontinental Railway report good progress on the work this winter. According to their estimates the coming year will see all the work except ballasting on some sections completed from Winnipeg to Moncton. Several of the divisions will be ready for operation and the whole should be taken over by the fall of 1912.

Messrs. Janse & MacDonell, contractors for the Alberni branch of the E. & N. Railway, which is operated by the C. P. R. on Vancouver Island, report that the last thirteen miles of roadbed from Quellicum river to Alberni will be completed by the end of January, that track laying will be started in February and that the whole line from Nanoimo to Alberni will be open for traffic by April.

The new yards of the Canadian Pacific Railway at Calgary are now practically completed. Sixteen miles of new track have been laid and the new buildings comprise a 20-stall round-house, a 40,000-gallon water tank, a 2,000-ton icehouse, and a new shed for outgoing freight, the old shed being given over to the incoming freight. A new wing is being added to the east side of the main station house.

The roadbed of the Canadian Pacific between Winnipeg and Portage la Prairie, 55 miles, is now entirely double tracked. Work on this section of the road had been going on for some months, and unusually good progress was made. There has also been considerable grading work done between Portage la Prairie and Brandon, 78 miles, where it is expected that a double track will be laid by November, 1911.

Remarkable Growth of the Canadian Northern

Some interesting figures of the remarkable growth of the Canadian Northern in the past fourteen years were recently given out by Mr. D. B. Hanna, third vice-president and general manager. In 1896, said Mr. Hanna, the company operated only 100 miles of track. To-day the length of track under operation and in course of construction is 7,135 miles. This estimate does not include the British Columbia section of some 600 miles, or the gap of 600 miles still to be constructed between Sudbury and Port Arthur. But it does include all of the lines in Ontario, Quebec and Nova Scotia. It is hoped that by the end of 1914 all the gaps will be filled in and that the system will then be a full fledged transcontinental with 10,000 miles of line in operation.

The pay roll has grown from $650 per month in 1897 to over $1,000,000 a month in 1910, and a gross revenue of $60,000 in 1897, to over $18,000,000 this year. In 1896 the staff included 13 men and a boy. To-day the employees of the railway and its allied industries number 48,400. At the present time there are 535 cities, towns and towns in embryo on the Canadian Northern Railway. Sixty of these towns have a population of over 500, and 85 places have been given transportation facilities within the past four months. The progress of the West may be further judged from the fact that in Alberta alone 20,000 acres of land are settled upon daily, and that every school day sees a new school house opened.

A Christmas Dinner at Montreal

The various constructional interests connected with the erection of the new Windsor street station at Montreal participated in a most enjoyable function recently when they held a Christmas dinner at the St. Regis Hotel.

Mr. W. S. Painter, chief architect for the C.P.R., who was in the chair, proposed the toast of "The King." The other toasts and speakers were as follows: "The Canadian Pacific Railway Company," J. R. Meadowcroft, F. L. Ellingwood; "The Architect," C. E. Deakin, W. S. Painter; "The Contractors," F. L. Ellingwood, C. E. Deakin and J. R. Meadowcroft; "The Steel Contractors," W. R. Duckworth, E. W. Brown; "Canada and Canadians," J. L. Thomas, Col. Evans and A. Boyer; "The Building Trade Merchants," G. B. Mitchell, D. L. Chadwick and Alderman Rutherford, of Westmount; "Our American Cousins," Col. Evans, F. L. Ellingwood and C. L. Weisner; "The Architectural and Contracting Staffs," G. McNight, J. L. Thomas, G. B. Mitchell and H. S. Brightly; "The Inspecting Engineers," C. L. Weisner, W. R. Duckworth and F. W. R. Cunningham.

The list of guests included: W. S. Painter, M. D. Barclay, F. Bell, C. Birmingham, A. Boyer, H. S. Brightly, E. W. Brown, D. L. Chadwick, A. Cherry, L. C. Content, H. P. Couillard, F. W. R. Cunningham, C. E. Deakin, F. Dufresne, W. R. Duckworth, Col. W. H. Evans, F. L. Ellingwood, F. O. Farey, H. Jenner-Fust, E. H. Kelly, E. C. Love, G. McNight, W. H. Madigan, G. B. Mitchell, J. R. Meadowcroft, W. J. Nicholson, M. Pope, E. T. Ramsay, C. B. Rittenhouse, W. Rutherford, G. W. Smith, J. L. Thomas, W. Tufts, Chas. Warnock, C. L. Weisner.

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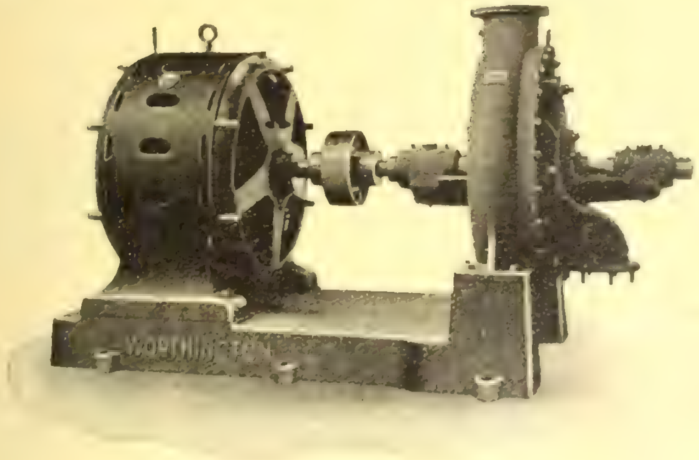

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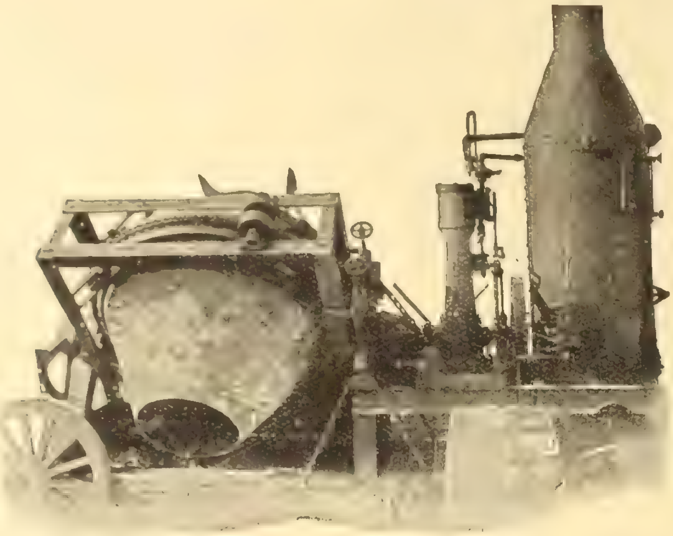

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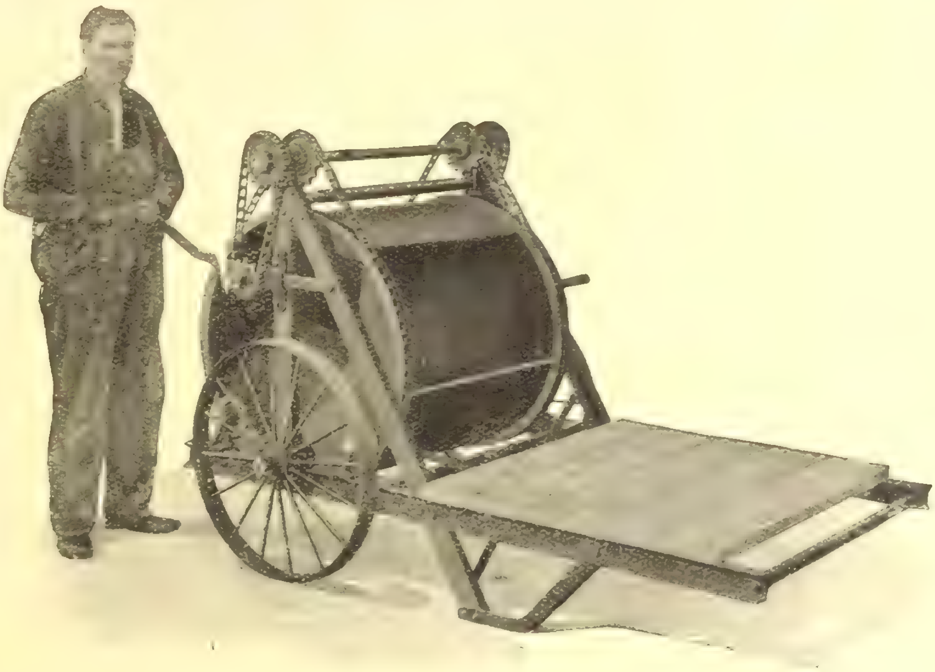

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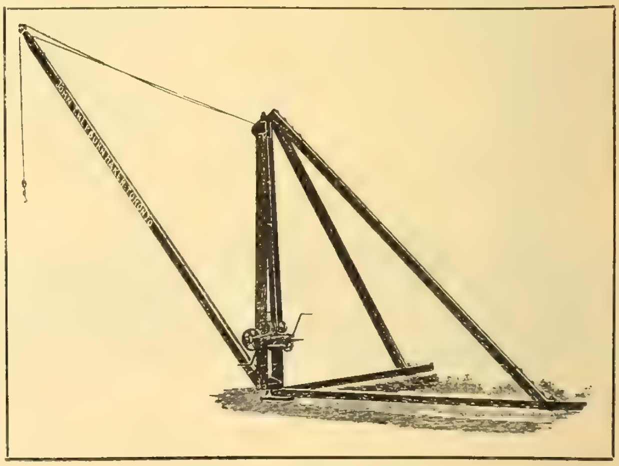

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Are Civil Engineers Unfair to Contractors?

Among some civil engineers in charge of public works, there is a growing tendency to place unnecessary hardships in the way of contractors, complains Steam Shovel and Dredge. Frequently exactions are demanded that mean financial ruin for the contractor. Specifications, loosely drawn, are taken advantage of to force contractors to do work which in justice and fairness they should not be expected to do.

There are some civil engineers, most of them but recently graduated from some technical college, who seem to think it is necessary for them to put a few contractors out of business, in order to establish a reputation for themselves. Reputations built up by such methods are neither creditable nor are they likely to be lasting. Engineers with practical experience know this and they endeavor to be reasonable.

It is only recently that a case of this kind was brought to our attention on a railroad job in the northwest. The contractor who was doing the work was being discriminated against by young engineers and every day he was losing heavily on the work. When it appeared that he would be forced into bankruptcy, he requested the chief engineer of the railroad to take a trip over the line and learn the actual conditions.

We could, if we chose, cite dozens of such cases and we insist that it is time to call a halt on such tactics. Engineers who have had years of experience in construction work understand that questions arising under the specifications must be dealt with in a common-sense way. They have no desire to see contractors ruined, though at the same time they protect the interests they represent.

The fault often lies in specifications, which are not properly drawn, and in the interpretation of which it requires men of experience and common sense. It is an easy matter to prepare certain plans on paper and draw up certain specifications. At the same time everyone knows that it is one thing to do work on paper and another thing to do it in actual operation. The contractor when he bids on the work, must in the very nature of things take some chance. He should be given every opportunity to make a reasonable profit, instead of being harassed and perhaps driven into bankruptcy.

Some Contractors' Shortcomings

Some contractors and builders have gained for themselves an unenviable reputation for honesty by their disregard for promptness in settling their material accounts. It might be added, though it is sad to relate, that there is some ground for this reputation, and that at least a few contractors have gained it by just cause from their actions. The policy of some builders is to get as much time on a quantity of material as they can, which is not a blamable method of doing business except that they will sometimes take advantage of the good graces of the material dealer to impose upon him. This lessens their standing, and decreases their credit to a considerable extent, and makes it harder for the man who is willing to do the right thing to obtain credit, writes Warfield Webb in the National Builder.

There is reason why every contractor or builder should be entitled to a certain amount of credit in his transactions with the material man. He takes most of his work on time payments, to be collected as the work progresses, and this simply enables him, in a large number of instances, to make his weekly payroll, and to meet such other contingencies as will arise. To pay for his materials until the contract has been completed, in a large number of cases, is naturally a difficult thing to do. Most material dealers and supply men understand and appreciate this fact, but they are still entitled to consideration, and they are placed in an awkward position at times to meet their requirements when the contractors are negligent about making their payments as promptly as possible.

You may give him a mechanic's lien, so as to protect himself against possible loss. This is merely a safeguard, and not a cash payment on his account. You may go farther and give him your notes, and he may discount them at his bank. If you fail to meet them when they are due it will place him in an embarrassing position, and will injure both his and your own credit and standing. It is not a matter of sentiment, for either the material man or for yourself, and is one that should be taken more to heart by the large majority of contractors. In order that the relations of the various interests in the building world become more pleasant, each should seek to do his duty, plain and simple. It costs no more, and the returns are far more agreeable and the outcome is of such value as to become an inestimable asset to each party.

The question of credits to-day is one of a complex nature. It has grown to such an extent that there is scarcely a transaction of any note that does not involve at least some credit, and that is one of the essentials that make for a much more wonderful and rapid growth to the business interests of our country. What is then desired is not an abuse of this system, but a more careful understanding and appreciation of the obligations of each party is of the highest importance to each. In order that we may enlarge the scope of our undertakings we must have credit, and this will be found to be the most notable feature in connection with our business career, provided we do not seek to make of it an unjust profit to ourselves.

In making a bid on any contract we must be able to know that our credit is sufficient to enable us to secure the required supplies as early as we desire them, so that there will be no errors in making a contract to do certain work. Our help can be obtained readily enough, because we understand that this will be cash, and that the payment of our help is to be met each week. Not so with our materials. We hope to get them promptly, and still we sometimes wish to ask unreasonable conditions of the material man in extending to us unlimited credit for the same. Do we realize that there is an injustice in this method of conducting our business? The material man is under no obligation to us, and we should hesitate in asking him to give us privileges that we are loth to ask of others, or to have others ask of us.

Enthusiasm

Enthusiasm is the greatest business asset in the world. It beats money, and power, and influence. Single-handed, the enthusiast convinces and dominates where the wealth accumulated by a small army of workers would scarcely raise a tremor of interest. Enthusiasm tramples over prejudice and opposition, spurns inaction, storms the citadel of its object, and, like an avalanche, overwhelms and engulfs all obstacles. Enthusiasm is nothing more or less than faith in action. Faith and initiative, rightly combined, remove mountainous barriers and achieve the unheard of and miraculous. Set the germ of enthusiasm afloat in your shop; carry it in your attitude and manner; it spreads like contagion and influences every fibre of your industry before you realize it; it begets and inspires effects you did not dream of; it means increase in production and decrease in costs; it means joy and pleasure and satisfaction to your workers; it means life, real and virile; it means spontaneous bedrock results—the vital things that pay dividends.—Selected.

Condition of Structural Iron After Long Service

For some years past certain government authorities in Germany have taken advantage of the occasions when an old iron bridge was being replaced by a new structure, by cutting samples from the metal of the old bridge and testing it to see whether the metal had lost strength by its continued service. Half-a-dozen or more such tests have been made, and uniformly the result has been very satisfying, giving practical certainty that a service of from 20 to 50 years wrought no injury to the metal.

The usual course of procedure was to cut two series of tensile-test samples out of floor beams, one set out of the middle part of the flange and one set out of the end of the flange; the latter metal, having been subject to only negligible stresses, would probably represent the original character of the material fairly well, while the pieces from mid-length of the flange would contain the effect of frequent repetitions of a moderate working stress. In testing these samples, the usual quantities were measured: elastic limit, ultimate strength, ultimate elongation and reduction of area at fractured section. In every case the results of the two sets of samples (end and middle) were as close as the unavoidable variations in material and in test-manipulation permit. Some tests, indeed, showed better results (higher strength and greater elongation) for the much-stressed (middle) samples than for the end samples, though not sufficiently better to be outside the range of unavoidable variation. Moreover, the results were normal for new iron, thus eliminating the possibility that both sets of samples might have undergone serious but equal change.

Some further tests were made during the past year, and the results were of the same character. A terse statement on the subject is made in the annual report of the Prussian Royal Testing Laboratory. We quote the passage as follows:

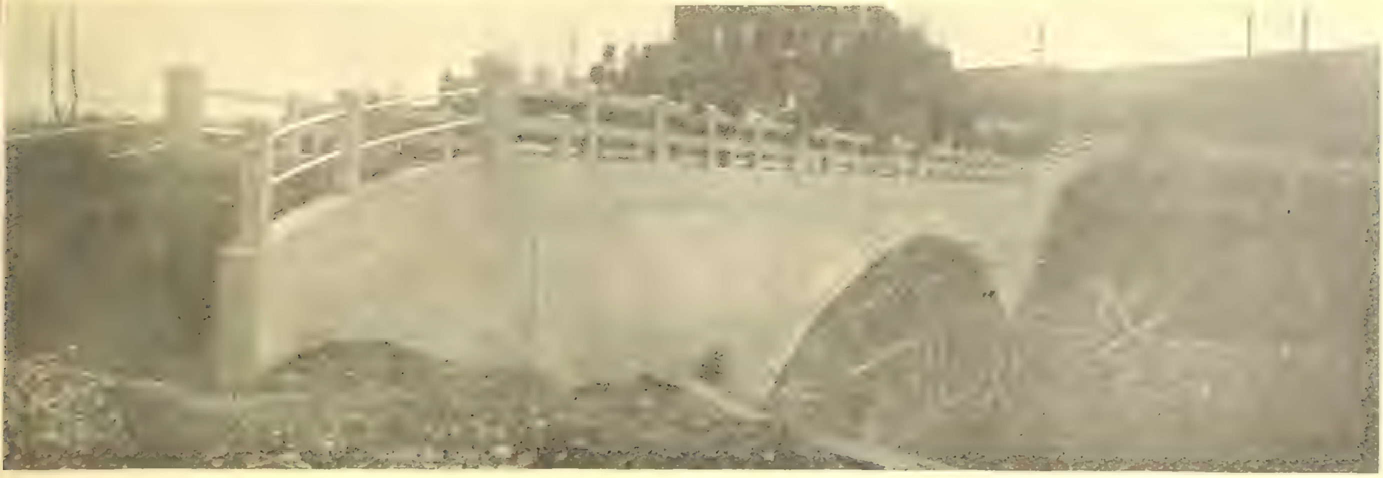
> Tensile tests of test bars taken from midspan and ends of chords and floorbeams of old wrought iron bridges (which had been renewed), ''showed almost exactly equal ultimate strengths and elongations'' for the corresponding pieces which had been under different stress. Comparative tests on annealed test-bars showed only slight decrease in strength. The results warrant the conclusion that ''the mechanical qualities of the iron were not injuriously affected by the service of approximately fifty years.''

In this case, says ''Engineering News,'' it is not stated whether the test-pieces were from railway or from highway bridges, though the former seems probable. Previously reported tests included railway bridges, at any rate. We thus have quite definite reasons for abandoning doubts which may have existed, on the question whether structural iron is slowly weakened by the innumerable repetitions of stress during service. Further, while the tests were all made on iron bridge material, our present knowledge of the relative behavior of iron and steel gives every reason to believe that the statement holds equally for bridge steel.

A water-main subway will be constructed under the Manchester ship canal to contain the third instalment of the aqueduct from Lake Thirlmere to Manchester. The subway will be at a depth of 60 feet below the water level in the canal and will be circular in cross-section, 14½ feet in diameter and lined with segmental plates 1 1-8 inches thick with flanges 6 inches deep. The vertical shafts at the ends of the subway will be 600 feet apart and also lined with cast iron. It is proposed to carry the three large mains through the subway on cast iron chairs.

Heat transfer through the walls of a pipe at any point is stated, by Mr. W. Musselt, in the ''Zeitschrift,'' of the Society of German Engineers, to be independent of the velocity, density and specific heat of the fluid in the pipe, but is directly proportional to the coefficient of heat conduction and inversely proportional to the diameter of the pipe.

Concrete telegraph poles 17½ feet high above the roof have been erected on one of the buildings of the United States Aluminum Company, at Niagara Falls, N.Y. They are 16 inches square at the base, 10 inches square at the top and are reinforced with eight ½-inch bars bound with ¼-inch hoops 18 inches centre to centre. At a height of 5½ feet above the roof and 4 feet above the parapet they are braced by three struts, two parallel to the building wall and one backward, all of them anchored to the roof by four ⅜-inch bolts 2 feet long. The struts are 12 inches square reinforced with four ½-inch bars and 5-16-inch hoops 18 inches on centres.



Reinforced Concrete Arch Bridge at Coaticook, Que.—Completed Structure Before Removal of Centering

A Noteworthy Reinforced Concrete Arch

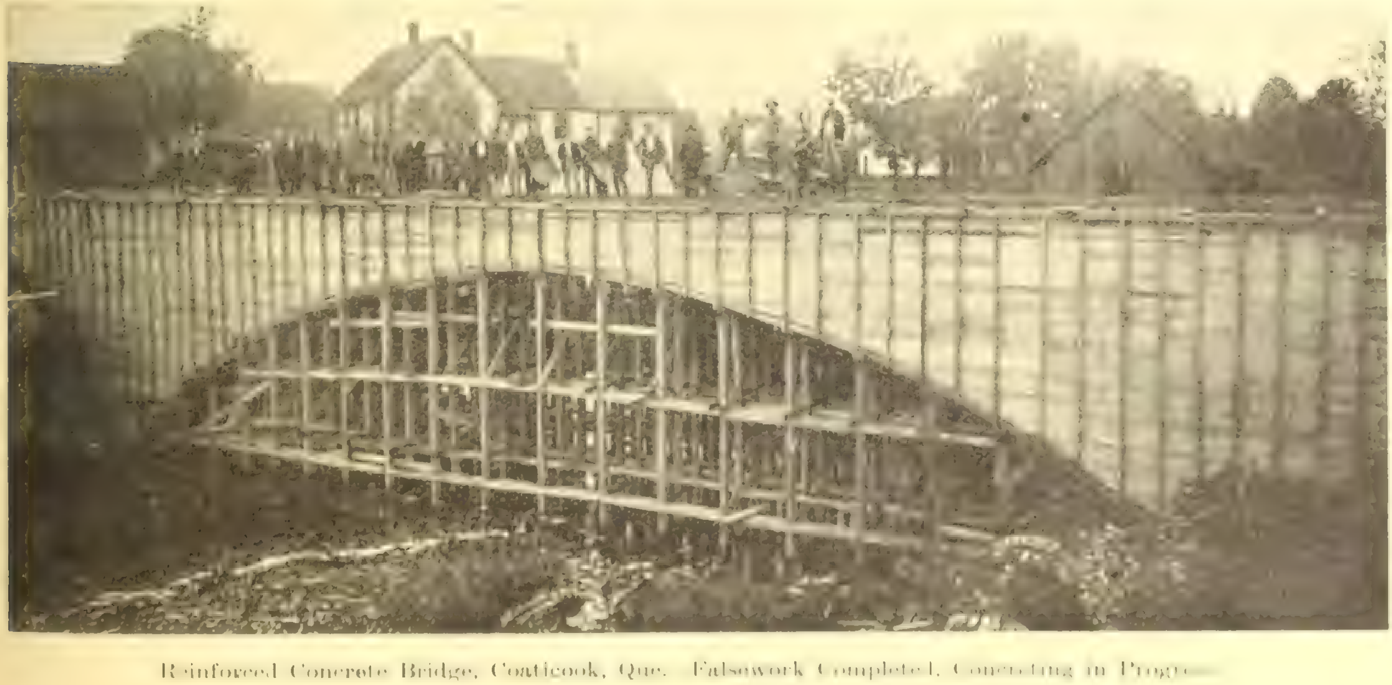
Possibilities of this Class of Construction Exemplified at Coaticook, Que.—Details of Design and Erection—An Expeditious Contract

Contractors:—Helmer and Winstanley

The river, at the bridge site, passes through a rocky gorge, the rock extending across the river bed and up the bank to a ground surface on each side. The southern bank of the river is nineteen feet higher than the northern bank, which necessitates a down grade on one side and an up-grade on the other. While this does not affect the strength of the structure in any way it detracts to some extent from its general appearance.

The total length of the bridge from end to end of the wing walls is 170 feet, clear span 100 feet, total rise from springing line 16 ft. 6 in. The bed of the river at the centre is 7 ft. 6 in. below the springing line. The thickness of the arch ring at crown is 24 in. The height of the bridge from springing line to top of spandrel walls is 21 ft. and the total width of the bridge, 19 ft. The spandrel walls are 9 in. in thickness at the top and constructed with a batter of 1 in. to 1 ft. on the inside, with an expansion joint at centre. Spandrel walls are supported by buttresses at the ends, the centre and at intermediate points, and the walls are surmounted by a concrete railing 3 1-2 in. in height.

The roadway is built up to grade with sand, surfaced with gravel. The material used in the construction was rock concrete, reinforced with twisted steel bars. The concrete was composed of cement, sand and broken field stone in the following proportions: One of cement, two and a half of sand and four of stone. International cement from Hull, Que., was used. The steel varied in size from one-half in. to three-quarter in., and 30 tons were used in this structure. The exca-



Reinforced Concrete Bridge, Coaticook, Que.—Falsework Completed, Concreting in Progress vation of the rock for the two seats was begun on September 19th, and the grading, which was about 1,400 yards was completed on October 25th.

The arch centres were struck on the 29th of November, careful readings being taken on different parts of the bridge during the progess of the work. Although the readings were taken to 1-1000 of a foot, no variations appeared in the readings taken before and after the removal of the arch centres. The total cost of the work, including all expenses, was in the neighborhood of $6,000.

Those directly in charge of the work were: E. V. Norton, mayor; Thos. McCurdy, M.D., chairman bridge committee; Magwood & Walker, Cornwall, Ont., civil engineers; S. A. Meade, Q.L.S., inspector; Helmer & Winstanley, Morrisburg, Ont. ,general contractors.

Filtration Plant at Portsmouth, England

Economical Disposition of Space—Arrangement of Reservoirs and Filter Beds—Saving in Excavation Effected—Other Features of the Work

As an addition to the water supply of the Borough of Portsmouth, England, there has recently been constructed a series of filter beds and reservoirs, which, while not being distinctly novel in general design, are so economically located as to be worth description. The works are described in a recent issue of London Engineering," from which the following account has been abstracted:

The water supply of the borough is pumped from adjacent chalk springs through three mains 20, 24 and 36 inches, respectively, and has up to recently been delivered to the houses after receiving only the purification which it could get in two sedimentation reservoirs. On account of the discoloration which occurs in wet weather after a period of drought, it was decided to install slow sand filters between the springs and the reservoirs, and to build two new reservoirs to take care of the filtered water. As a part of the new work, covers were added to the old reservoirs. The old reservoirs were located on the side of a hill, partly in fill and partly in cut, and the new works were placed immediately alongside. This necessitated the upper end of the filters being put into the side hill and required that their lower end be some distance above the surface of the ground. In order to economize space, it was decided to place the new reservoirs partly under the filter beds. This not only reduced the area required for the total plant, but also materially reduced the amount of excavation and fill necessary.

Fig. 2 shows a section through the plant from the high point or upper end of the filter to the low point or lower end of the new reservoir. It will be seen that the north ends of both the filter beds and of the new reservoirs are formed in the steps cut out of the hillside, which is of solid chalk. At the north end the filters rest directly upon this chalk foundation, but at their south end they rest on the arched roofs of the reservoirs. These arched roofs are of concrete resting in turn on brick walls running north and south in the resevoirs and spaced about every 16 feet. To save weight and material the brick walls are arched. The divisions between the adjacent filter beds and also between the adjacent reservoirs are made by heavy concrete walls, laid up inside of a brick facing, afterward covered with a 1-in. cement coating. The bricks were used here because it was thought they would give a better line than timber forms and because also they make a better base to which to apply cement grout.

Those parts of the new reservoirs which are outside of the filter beds and all of the old reservoirs, are covered with a reinforced-concrete roof resting on concrete columns.

The seven filter beds are each about half an acre in superficial area, and each contains 3 feet of sand over 9 inches of gravel carried on a loosely-laid brick bottom. The raw water enters at the north end of each

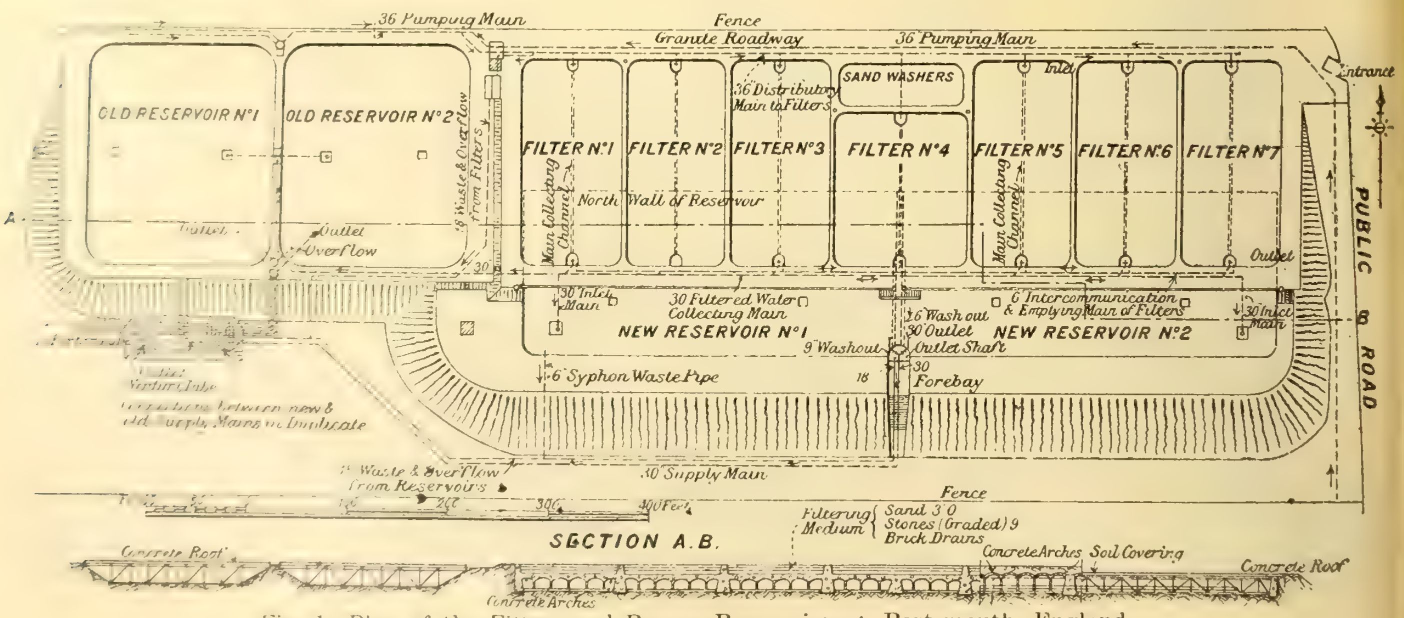


Fig. 1 – Plan of the Filters and Roman Reservoirs at Portsmouth, England

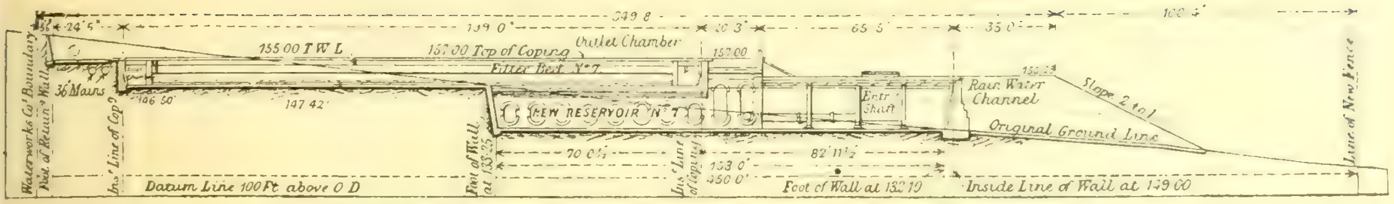


Fig. 2 Transverse Section Through Filters and New Reservoirs

bed and after passing through the sand runs into a collecting trough in the middle of each bed out into the 30-inch main and thence into the reservoirs. The total filtering capacity of the plant is 12,000,000 imp. gals. a day. Each of the two new reservoirs measures 360 by 160 feet and contains 13 feet 6 inches depth when full.

Cutting Steel Sheeting with Oxy-Acetylene Blowpipe

In excavating the foundations for the chimney of the new sewage pumping station at Baltimore, Md., the conditions were found to be such that it was necessary to widen the footings. This was done, according to the last annual report of Mr. Calvin W. Hendrick, chief engineer of the Sewerage Commission, without increasing the size of the excavation at the surface, by driving United States steel sheet-piling at a considerable angle in the lower part of the excavation. The upper ends of this sheeting projected inside of the designed lines of the foundation masonry, and, as it was embedded in the masonry, it was necessary to cut them off. It was impossible to get behind the sheeting at the proper elevation, and it therefor could not be cut off with hack-saws, and cutting it with cape-chisels would have been very tedious and expensive. There were two methods open, however, either of which would accomplish the work quickly and at a reasonable cost, these methods being the use of either an electric arc or an oxy-acetylene blowpipe; the latter being by all means the cheapest and most satisfactory, the work was done by this method. The gases used were generated on the spot, the oxygen being obtained by the distillation of potassium chlorate, and the acetylene from calcium carbide and water. On account of the small size of the apparatus used and the thickness of the sheeting at the bulbs forming the joints between the several sections, it was found that the heat was conducted away so rapidly from the bulbs as to make the process of cutting through them very slow; a crude oil blowpipe was therefore first used to heat the sheeting to redness, after which the acetylene blowpipe was applied to cut it off. This was done very quickly, although the thickness at the bulbs was considerably over 1 inch. The oil blowpipe was used only in order to expedite the work, as it was found possible to cut through the bulbs by means of the oxy-acetylene blowpipe alone.

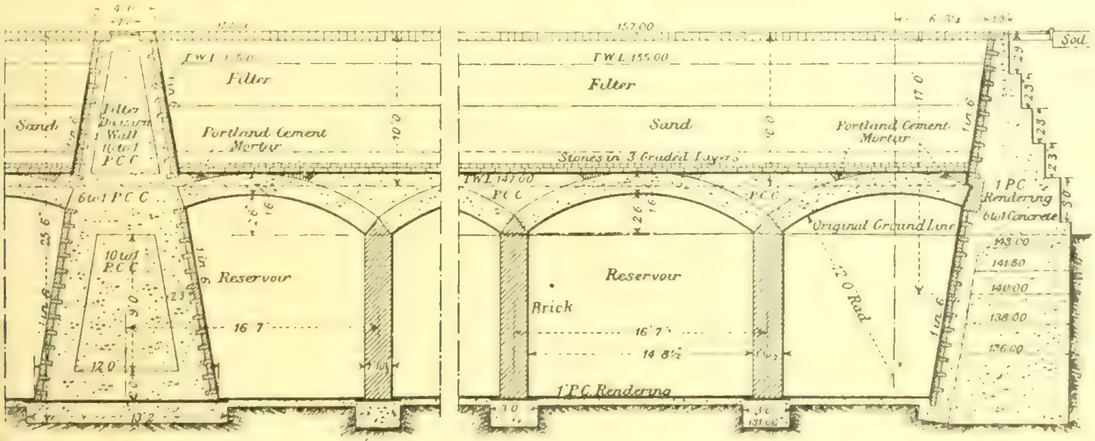


Fig. 3—Details of Reservoir Walls with Filters Above

Close-jointed granite block pavement was experimented with at Boston, Mass., during 1909, and in the last annual report of the street department of that city, from which these notes are taken, Mr. Guy C. Emerson, at that time superintendent, expresses the hope that this method of construction may be adopted as a standard for the future. Since the general use of concrete as a base it has seemed to him that the conventional block in Boston, with its depth of 8 inches, contained an excessive amount of granite and the depth rendered it impracticable to prepare the vertical faces in such a manner as to lay with a close joint. A block of approximately 5-inch depth, with the same wearing surface, has been laid to cover 12,000 square yards on Massachusetts avenue with a maximum joint of ½-inch. This, Mr. Emerson states, has given a very satisfactory pavement, of greater smoothness than the previous standard. It is anticipated that the close joints will obviate the rounded corners now so common and also prevent to a great extent the noise from granite blocks. It is also believed that a softer quality of granite may be used than formerly, offering a more gritty surface and better foothold for horses than the hard granite.

A shortage of building supplies is reported from Calgary, where operations are stated to have been delayed, owing to the impossibility of getting material quickly enough. A notable shortage of brick is reported. The permits to date total five millions. The greatest optimism is prevalent. Building Inspector Harrison looks for an expenditure of 10 million dollars on building work during 1911.

Figuring Cost of Concrete Construction

Intimate Practical Knowledge of Work and Materials essential to Intelligent Bidding The Cube System of Estimating—Records of Cost

By Charles L. Shepley

As practically all concrete bids are now let on a competitive basis, it is highly important for the estimator to approach the problem of cost with a thorough knowledge of the actual mode of construction and a general knowledge of material and labor costs.

As an average problem, let us assume that the reader wishes to estimate the cost of a re-inforced concrete building, and is well able to estimate carefully the cost of the brick work, stone work, mill work, glass, and in fact everything but the concrete work. The plans show the structural frame-work of concrete, the thickness of the floor slabs, and the size of the beams and columns, also the number and size of reinforcing rods, so that the amount and size of all the ingredients are clearly laid out and the problem is to gather together the units in a suitable way, in order to apply the units of cost. The frames which support the concrete work are customarily estimated at a price per square foot of superficial area, varying from 7 to 15 cents per square foot according to tahe intricacy or strength of construction. So the reader's first step is to itemize the number of square feet of area under the slabs, and on the sides of the beams and their soffits, upon which we will say a price of 10 cents per square foot of surface, which would ordinarily cover a plain, symmetrically arranged beam construction.

The square feet of area on the outside of the columns is next itemized, and a unit price applied to this, say 11 cents per square foot for a square column of ordinary length. The next step is to estimate carefully the cubic yardage of concrete in all slabs, beams and columns, which is customarily all lumped under one item of cubic yard of concrete and priced at, say, $7 per cubic yard. This, of course, applies only to the raw structural concrete and not to any cement finish, which is usually priced by the square yard, varying from 30 cents to $1.25 per square yard according to the mixture and thickness of the cement finish specified. For one inch of cement finish, mixed in the proportion of one part of cement to two parts of sand, a customary price is 60 cents per square yard.

Cheaper to Do Bending at Mill.

When round columns are used and metal forms are resorted to, these may usually be bought and erected for about 10 cents per square foot of the surface area of the columns. Corrugated iron forms for the under side of slabs may be placed at a cost of about 3 cents per square foot of area, and when this type of forms is used, the wooden posts and braces supporting the slab may be priced considerably lower, owing to the fact that much less lumber is needed, as the corrugated sheet iron will span a considerable distance between supports, making it unnecessary to have a solid plank floor. Forms of this type may be erected at 8 cents per square foot for large works. The reinforcing used in the concrete is usually priced by adding to its cost delivered to the work, a price per ton for its erection. The judgment of the estimator must here be fortified by experience with jobs of a type similar to that proposed, as various works reinforced with round rods will vary in the cost of erection from $4 to $20 per ton, while patented rods have been used with as great a variance in cost. The amount of bending and tying to be done greatly influences this cost, and many of the modern works are having every unit of the reinforcing delivered to the job bent, ready to be placed. When this is done the bending can usually be done much cheaper at the mill than in the field.

As a specific example of the variance in cost for bending rods, an accurate cost sheet was recently kept on a very large piece of work, and it was developed that the total tonnage of steel bent for the girders above the second floor cost $10.74 per ton, while another class of rods bent for girders cost only $5.87 for bending. From these facts it will be seen that it is impossible to place a fixed price for bending rods on a tonnage basis. Experience in similar cases of work can be the only guide which will keep the estimator within safe limits. An ordinary job in which round rods are used in plain work, and where there is a large repetition of panels of similar size can be placed at $1 per ton, ready for the concrete to be poured. No set price will cover any one type, however, as many conditions govern the cost of the reinforcing, and experience is the only teacher that will make you a good guesser.

Keep All Cost Data.

A common practice now used by many firms which furnish the reinforcing for a job, compete, is to deliver all of the reinforcing steel to the work, all fabricated and ready for erection. The columns are delivered all built up, with spirals coiled and spaced, the beam rods bent and designed and held in position by spacers, ready to be placed in the beam boxes, and all straight rods cut to exact lengths. When the steel comes in this form, the cost of erection is greatly reduced, and it can sometimes be placed as low as $6 per ton. Competition has now become so active that the contractor of to-day seldom bothers to estimate carefully the total steel tonnage, but relies largely on bids sent to him giving a lump sum price for all the reinforcing delivered to the work, and it remains only for him to place a price on the erection of the wall.

Owing to many designs proposed for a single work involving various amounts of concrete, steel and forms, it becomes necessary to summarize the amounts for each design and price each in accordance with your judgment of the amount of work involved in order to arrive at a conclusion as to which is the cheapest of the proposed schemes. The only safe way to price a reinforced concrete job is from the costs learned in actual work, and it is highly important for the beginntr in this field of engineering constsuction to keep a secord of every available scrap of information on reliable cost data, as this habit will place firmly in his mind a remembrance of the cost of similar work previously done along the same lines. It is also advisable to obtain a cubic foot price on various jobs as an aid to giving a prospective buyer a rough approximate cost on certain types of structures. This so-called system of cubing is perhaps the most definite and reliable of any method of getting a rough, approximate cost.

Estimate Cost by Cube System.

Several methods are used to determine the cubical units, depending upon the shape and size of the propo sebuilding. One method is to multiply the square feet in the plan of the building by the height from half-way the depth of the foundations below the ground level, half-way to the roof. Another system uses the height from the bottom of the foundations and another obtains the actual cubical contents. Any of these systems may be used so long as the same one is adhered to in every case. It is advisable for one to obtain the actual cost per cubic foot on every reinforced concrete building erected by him. It will then be possible for him, guided by his knowledge of the conditions under which each structure was erected, to determine fairly accurately the cost per cubic foot which should be applied to any proposed new structure. Of course, even long experience will afford no safeguard against unusual construction in the interior of a building, so that a cubic foot price can be applied only to plain buildings of ordinary character and comparisons are reliable only between buildings of similar description and for similar uses. It is also highly important that one should keep accurate cost data on every piece of work undertaken, as these will serve as guides in pricing other work of a similar nature.

As an example of this, let us cite two or three cost sheets covering various kinds of work in which cement was used, and see what conclusions may be drawn from the costs obtained upon each piece of work per unit of quantity or area.

For instance, the cost of a retaining wall built during the winter months and under extremely severe conditions of construction, appears on the cost sheets as follows:

369 hrs. foreman laborer, 35		$ 129.15
197 " laborer, 25		49.25
134 " laborer, 22½		30.15
1531 " laborer, 20		306.20
11778 " laborer, 17½		2,061.15
703 " teams, 47½		333.92
84 " blacksmith, 32½		27.30
244 " carpenter, 50		122.00
36 " carpenter, 47½		17.10
1055 " carpenter, 45		474.75
240 " foreman K. P. G., 45		82.30
339½" engineer, 40		135.80
		$3,779.07
Less received for hauling dirt		10.32
		$3,768.75
1114¼ bbls. Cement at $1.15	$1,281.39	
121 sacks lost at .10	12.10	
		1,293.49
952 cu. yds. crushed rock		1,448.45
43630 lbs. coal	109.08	
3 days train service hauling dirt, $40	120.00	
Switching dirt	21.75	
12 bolts and washers	1.92	
11 rolls tar paper	5.50	
		258.25
Total cost		6,768.91

Total cubic yards 1118

1118 yds. concrete at $6,768.91 = $6.05 per cu. yd. cost.

1118 yds. concrete at $3,779.07 = $3.38 per cu. yd. for labor.

It will be seen by the above that the concrete for this particular retaining wall cost exactly $6.05 per cubic yard, without the contractor's profit, and we might assume that should a similar piece of work again occur it would be safe for one to place a cost of $6.65 per cubic yard upon the new yardage to be estimated. This would

Records of Plastering Cost.

As another example, we take the cost sheet covering the material and labor required in plastering with cement plaster the exterior of a large building, the exterior walls having been constructed of hollow tile, upon which the cement plaster was directly applied.

Actual cost of labor and material:

32 hrs. later, 60	$ 19.20
4 bdls., metal lath	22.00
600 hrs. plasterer, 63	378.00
200 sacks Portland cement	110.00
500 hrs. plaster helper, 30	150.00
35 bbls. brown lime, 65	22.75
14 single loads sand, 50	7.00
Drayage	25.00
	$733.95

1056.6 yds. at 733.95 = 69.4c. per sq. yd.

In this work there were 1056.6 square yards, and the actual cost of 69.4 cents per square yard. The mixture used was: 7 parts sand, 2 parts brown lime, 2 parts Portland cement.

The above cost sheet gives the estimator, figuring upon similar work, accurate data upon which to base the cost of plastering on hollow tile under fairly similar conditions.

It is examples such as the above that are of real service to anyone in the contracting business, and the benefits gained from keeping accurate cost data on each job cannot be valued too highly. There are hundreds of contractors who now operate on large and small scale who do not know the actual cost of an individual piece of work constructed under their care. They know the price at which they are warded the contract, and they know the cost of the total work, but beyond that they have no knowledge of the actual cost of the various units that go to make up the job. They may price concrete at $7 per cubic yard when the actual cost is only $5 per cubic yard, and in so doing are estimating a profit which is too large to be warranted under the close competitive figures now taken. If a contractor kept actual cost data he would know before considering work, that the concrete would cost only approximately $5 per cubic yard, and if satisfied with a profit of ten per cent, would price it at $5.50 rather than at $7, which would on a large piece of work act greatly to his advantage in putting in a competitive bid.

Adaptable to Many Conditions.

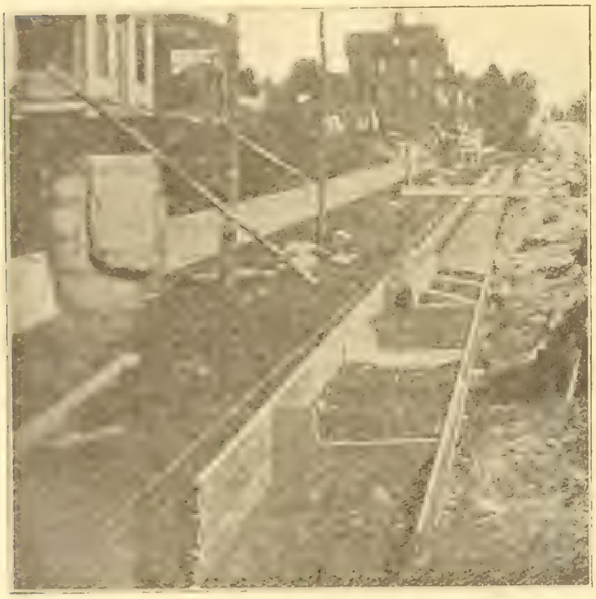
Not many years ago one would look incredulous if told that some 10,000 cubic yards of stone had been molded into a mammoth building seating some 15,000 people, and that this work was accomplished in the short period of 70 working days. Yet this feat was undertaken and completed about a year ago in the building of the Minnesota State Fair grandstand. Concrete forges steadily ahead by virtue of its adaptability to so many requirements. In the minds of many engineers, concrete is the logical solution of nearly every problem requiring speedy erection, great strength, durability and low cost.—Concrete.

Combined Curb and Gutter Construction

Importance of Good Materials properly proportioned — The Introduction of Steel Forms in Street Concrete Work — Value of Standard Specifications

By An Engineer

There are few branches of concrete work in which the contractor will welcome improved methods more than in the construction of combined curb and gutter. When this work began to be undertaken a few years ago it was quickly realized what a desirable feature of street work it was and how much better it looked than the ordinary straight curb. Since then the spread of this construction has been very rapid. Real estate people are quick to see that a street improved with a fine appearing curb and gutter makes property much more saleable and contractors in all progressive communities are having difficulty to lay combined curb and gutter fast enough to meet the demand.



Metal Curb and Gutter Forms in operation, showing the manner in which they are used

Contractors, however, do not all yearn for this kind of work as they find it slow and expensive. In fact, under the methods generally in vogue a good round price must be charged in order to leave any profit in it for the builder. Furthermore it is only fair to admit that a great many contractors have gone into this line of work without realizing some of the important conditions which must be fulfilled if the work is to last and give satisfaction.

It is unnecessary here to point out the importance of good materials properly proportioned. If the contractor has not already learned this lesson, it is too late to change him now, and if he is inclined to believe that it is better to skimp a little here and there for temporary profit rather than to build up a reputation for first-class workmanship and materials, these points are not intended for him.

In pointing out the development of the past year in concrete work it is difficult to put one's finger upon the most important changes or improvements that have been made, but I think it would be fair to enumerate as one of the most important the introduction of steel forms to take the place of wooden molds in certain forms of street concrete work. This is particularly the case with combined curb and gutter work, and the steel forms which have been put on the market for this purpose are deserving of careful attention. There are now for sale a number of different devices for curb and gutter work, but I prefer to describe for the purpose of this article the system of steel forms devised by the Hotchkiss Company and uniform with the so-called Hotchkiss system. The steel forms for sidewalk construction which are put out by the Hotchkiss Company are widely known and it will therefore perhaps be easier to describe this particular system of steel curb and gutter forms to illustrate this development.

The principle of the operation of these forms is the use of pressed steel channels for front and back molds, and in between these channels division plates or templates shaped to a cross-section of the desired curb and gutter. These division plates have tongues which project through slots in the steel channels and lock on the outside by means of lugs. When put together these channels and templates make a rigid structure which is self-sustaining and self-bracing. A glance at the cut will give a good idea of the method of setting up and operating the forms.

In witnessing an extensive piece of work done with these forms recently I noted that the contractor had hit upon a clever scheme of levelling his forms, which may be of interest to the reader. Instead of setting up the forms in sections and then raising or lowering each section to conform to his line, he simply drove into the ground at the bottom of his excavation at intervals a series of graded stakes and then set his forms up on top of these stakes.

Before witnessing the piece of work above described, I was inclined to fear that the work would not stand up properly if the forms were removed from it immediately. The curb in question was 12 inches high and it looked as if this would make a wall that would in part sag or fall down if the forms were not retained on it long enough to permit an initial set. I was agreeably surprised, however, to find that when the forms were removed no trouble of this kind whatsoever appeared. The manufacturers had taken the precaution of giving the back of the curb a batter of 1 on 12, and this was sufficient to avoid the danger.

I was pleased to note in the job in question that the contractor mixed his concrete stiff. It is a fad of mine that the secret of good sidewalk work is less water and more tamping, and this is equally true of curb and gutter work. I noted also that the contractor in question put on his top coat stiff enough so that he could tamp it and thereby not only make an excellent bond with the base, but also flush just enough moisture to the surface for finishing immediately. This is an excellent point for all sidewalk and curb and gutter contractors. If you will put in a stiff top coat and then tamp it you can easily strike off the surface and finish it immediately.

I have seen many pieces of work ruined because too much water was used in the concrete and when the walk was ready for finishing the finishers had to stand around and wait for some time before they could do their work, and they would frequently sprinkle dry cement on the surface in order to dry it out sufficient for using the float. This reprehensible practice is now pretty generally forbidden in municipal specificatons and it should never be resorted to if you desire a good job.

One thing in the use of the above mentioned forms that pleased me particularly was the ease and rapidity with which they could be taken down and then set up further on. The contractor whose work I was observing did not have a very extensive equipment of forms, but used the same forms over six or eight times during the day, and I should, at a rough guess, estimate that his 30 running feet of forms would easily take the place of 200 running feet of wood forms and could be set up in a small fraction of the time.

I was much interested in observing the method of finishing used. The contractor in question did not permit the use of a steel trowel on his work, but insisted on the use of a wooden float which was applied as soon as the surface had been struck off with a piece of angle-iron operated by two men with a sawing motion. This latter device is simple, but it is very effective and it is surprising that it is not more generally used.

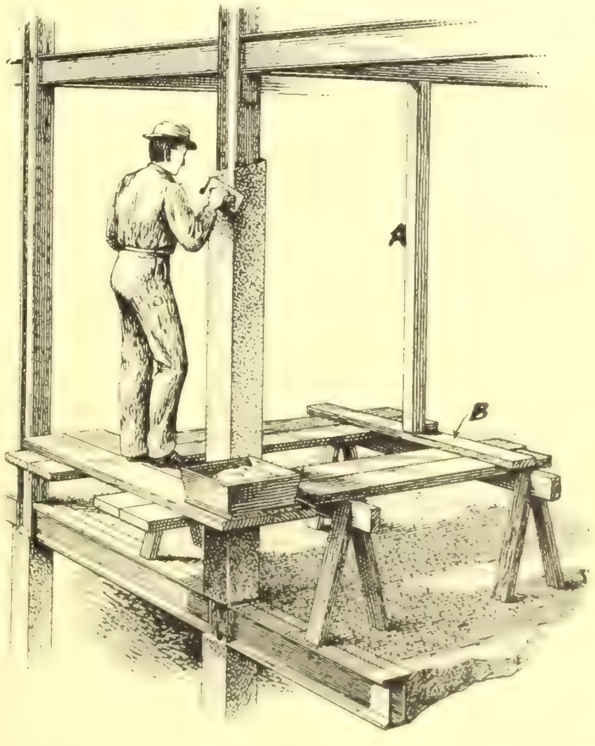
I mentoned above the use of the wooden float and it is worth while laying some emphasis upon this matter. Many a job that was otherwise good has been ruined by too much trowelling. The working over of the material has a tendency to force to the surface an undue proportion of the fine particles of cement and thereby not only rob the aggregate immediately below of its proper binding elements, but also to make a thin hard coat on top which after a time cracks and scales off. This is true both of sidewalk and of curb and gutter work. If on the other hand you will use a wooden float and not overdo the matter you will see it is possible to follow this up by brushing the surface off lightly with a dampened brush and give your work a finish, which is not only handsome, but which also is very practical. In preventing slipping it is much more effective than any stippling or brush-hammering.

One other point in connection with curb and gutter work appeals to me strongly, and that is the question of standard specifications. To a certain extent this is a point which largely concerns the city engineer or the board of public works, but the contractor also is in a position to be of influence in this matter. Nothing is more important for the good appearance of the streets of a city than uniformity in the dimensions of its curb and gutter work. Nothing is so well calculated to give a bad impression to the visitor than to see such work done in different sizes and proportions throughout a city. Of course, t is perefectly feasible for a city to adopt specifications of its own and insist that these be followed out on all work in the city, but in many cities this has not been done and there are frequent opportunities for the contractor himself to recommend to the property-holder dimensions and specifications for this work. It may not therefore be out of place to call your attention to the fact that a large number of the progressive municipalities of the country have adopted as a standard size of curb and gutter the following dimensions: Height of curb 12 inches, thickness of curb 6 inches, height of face of curb 6¼ inches, gutter 18 inches with a dip of 1½ inches, thickness of gutter at front 7 inches, curve on edge of curb and at junction of curb and gutter 1½ inches radius. Such a curb and gutter as this will be found to give general satisfaction everywhere. It is not necessary to point out here that the curb and gutter should be divided into entirely separate blocks from 6 feet to 8 feet long by expansion joints and it may be noted that steel forms such as those above described, or in fact any regular templates, make these joints without additional expense.—Cement Era.

A Form of Cantilever Scaffold used by Builders

In the construction of modern buildings of great height, many expedients are often necessary in order to facilitate the execution of the work. Attention is directed to a style of cantilever scaffold, which is used about the line of iron columns extending around the outer edge of a structure, the position of the scaffold being such that one end of it projects beyond the building.

A study of this scaffold shows that it is prevented from tilting by means of a cross piece and upright. The planks are supported on masons' horses and used for supporting the workman while he paints and cements the outside faces of the front columns, channels and I-beams. The picture shows a mortar box placed near an outer column, while the workman upon the scaffold is enclosing in cement an iron column at one of the floor levels of a steel skeleton-frame building. The position of the scaffold is such that the workman is able to reach to the level of the floor above.



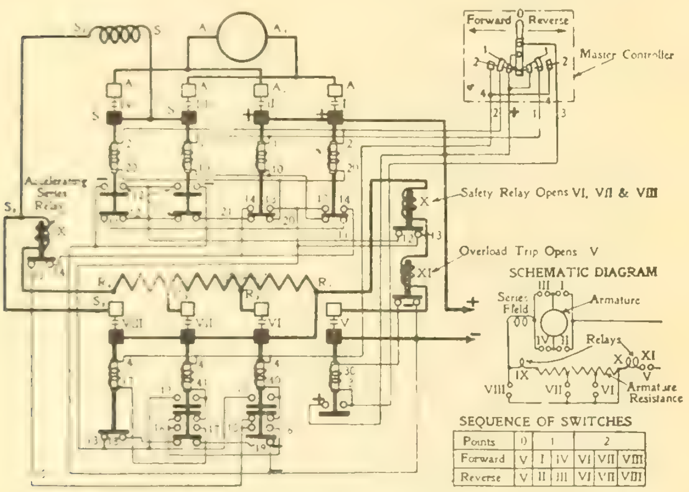
The planking used for this scaffold is 2 x 8 inches in dimensions, the cross pieces upon which the workman is shown standing being 10 feet in length, while the planking running at right angles thereto is 16 feet in length. The strut A is driven tight under the bottom flange of the I-beam to keep the planks upon which the workman stands from tipping up, while the cross piece B is a 2 x 4. The simplicity and rapidity of the construction of a scaffold of this nature render it extremely useful in cases of the kind mentioned

Notes on Electrically Operated Shovels

Various Uses and Advantages — Mechanical Equipment—Protection of Motor by means of Automatic Magnet Switch Control—Operating Costs*

During the past six years great strides have been made in the application of electricity to power operated shovels. At present a number of them are being successfully used in grading operations, gravel pits, stone quarries, brick and tile yards, cement plants and in placer ore mines. These shovels are fully equal in power and capacity to steam shovels and may be used for any service desired.

Equipment. The mechanical equipment of an electrically operated shovel, i.e., the dipper, boom, car and trucks, is built along the familiar lines of the steam shovel. The power equipment consists of a motor of from 50 to 200 h.p. to operate the hoist, and two motors of from 25 to 80 h.p. to swing the boom and operate the thrust. The hoist and swing motors are located in the car, and are geared to the drums through suitable reducing gears. The thrust motor is mounted directly on the boom, and communicates its motion to the bucket staff through reducing gears connected to a pinion engaging a rack on the staff. The motors are of the crane or mill type, with high torque characteristic, and may be for either direct or alternating current. They are reversing and are under perfect control. When desired the controllers may be connected to the ordinary hand lever used on steam shovels, so that a steam shovel engineer can operate the electric shovel without any trouble. Data in regard to the sizes, capacities and motors required are given in Table I.



Points	0	1		2		
Forward	V	I	IV	VI	VII	VIII
Reverse	V	II	III	VI	VII	VIII

Connections for Electrical Control of Steam Shovels

The power is ordinarily taken from trolley wires, or from a transformer located near the cut, the feed cables from the power circuit to the car being wound on a retractile reel in the cab and drawn in or paid out as the cut advances. The wiring in the car is enclosed in conduit, and is well protected from moisture and mechanical injury.

The chief objection in the past to electrically operated shovels has been the possibility of damage to the hoist motor when stalled, due to the bucket digging in too deep, or striking a rock or other obstruction in the bank. The heavy current taken at such times was liable to cause a burn-out, while if the motor was properly protected by fuses or circuit-breakers, their continual opening caused annoying interruptions of service. This difficulty has been overcome by the use of automatic magnet switch control, which protects the motor against such overloads by cutting resistance into the circuit when the current exceeds a certain value.

The accompanying diagram shows the connections for such a method of control. The master controller has two running positions in either direction. The first position connects the motor to the line with all the armature resistance in series, the second position energizes magnet switches VI, VII and VIII through the accelerating relay IX. These switches short-circuit the resistance in sections, each successive step being delayed until the current in the accelerating relay falls below a fixed value. The various positions are interlocked, so that it is impossible for the switches to close in wrong order. The master controller can be thrown from full speed forward to full speed reverse, without damage to the motor, as the starting switches for either direction cannot close until all the control switches are opened and full armature resistance has been connected into the circuit. The reversal is thus made in the least possible time consistent with the safety of the motor.

In case of an overload on the motor, safety relay X opens, breaking the control circuit of switches VI, VII and VIII, and cutting all the armature resistance into the circuit. The motor will then exert its full starting torque continuously until the overload is removed, when the resistance will be automatically short-circuited again. This feature of the control is especially valuable for shovel work, as frequently a stone or log may be dislodged by a steady pull when it cannot be moved by a sudden jerk. If the overload current exceeds the value for which the overload relay XI is set, the line switch V opens, disconnecting the motor from the line. On moving the master controller to the off position, magnet switch V is reset, and the motor may be started again in the usual way.

TABLE I—ELECTRIC POWER SHOVELS.

Weight of Shovels, Tons.	Size of Dipper, Cu. Yds.	——Hp. of Motors—— Hoist.	Thrust.	Swing.
30	1	50	30	30
35	1¼	50	30	30
35	1¼	60	30	30
35	1¼	75	35	35
42	1½	75	30	30
65	2	100	35	35
95	3⅓	150	50	50
100	4	200	80	80

Where a more flexible control is desired a five point master controller is used. In this case, each of the switches which cut out aramture resistance is controlled by a separate point on the master controller. The amount of resistance in the circuit is, therefore, under the constant control of the operator. At the same time the controller can be thrown immediately to the full speed position, and the motor will be automatically brought up to speed as rapidly as the accelerating relay will allow.

The motor driving the thrust may be operated either by a drum controller or by automatic magnet control. The motor and its controller must be of such a design that the motor will be able to develop a heavy torque for short intervals of time while standing still, or rotating very slowly. Its duty is to jam the dipper against the bank and hold it there while the hoist operates. As soon as the dipper strikes the bank the thrust motor ceases to revolve, except very slowly, but must still exert full torque in order to keep the dipper against the face of the cut. Its characteristics should, therefore, be such that it may be stalled frequently for a minute or more at a time and still keep developing full-load torque without injury.

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*A paper by W. H. Patterson in the Electric Journal

The motor driving the swinging boom may be operated by hand control if provided with a magnetic brake to stop the motor quickly and keep the circuit-breaker from opening if the motor is reversed quickly; or may be operated by automatic control without a brake. The operator can place the bucket with greater precision and ease with the automatic control on account of the rapidity with which the magnet accelerates the motor. The controller panels and switches are placed in the rear of the car, while the faster switches or drum type controllers are placed in the front within easy reach of the operator. This makes a very compact and accessible equipment.

Operating Costs.—Whille the initial cost of electric shovels is more than that of steam shovels, their operating cost is much less. They can ordinarily be operated by a smaller number of men; the hauling of coal and water is dispensed with; their power economy is greatly superior to that of the steam shovels, and they can be handled with greater precision and rapidity. In addition the electric shovel is comparatively noiseless in operation, which is a great advantage for city use.

Some interesting data in regard to the cost of operation of electric shovels has been obtained by the Vulcan Steam Shovel Co., of Toledo, O. One of these shovels, has been operated by the Milwaukee Electric R. & Light Co. for several years, at a consumption of approximately 100 kw-hrs. per ten-hour day. It is used for loading gravel at a gravel bank and is operated by two men, who load from 300 to 400 cu. yds. of gravel per day. The average daily expenses of operating this shovel are:

One engineer	$2.00
One craneman	1.75
Electric power at 1.5c. per kw-hr.	1.50
Oil, waste, repairs, etc.	.75
Total	$6.00

The Chautauqua Traction Co., of Jamestown, New York, has been operating a shovel equipped with a 75-h.p. hoist motor, since 1907. This shovel is used in loading a mixture of gravel, sticky clay and sand, which is very hard to dig, and is operated by two men on the shovel and two pitmen. The current consumption on a special test averaged 163 kw-hrs. per 8-hour day, and 534 cu. yds. of material were loaded in an average day. The The total expenses per day, including the pitmen, were $8.80, or approximately 1⅔ cents per cu. yd. The maximum capacity of this shovel is about 1,000 cu. yds. per 8 hours. If operated at this capacity, the power consumption would be increased in proportion to the output, but the labor charges would be the same as figured in the above statement. This would bring the cost of shoveling down to about 1 cent per cu. yd.

Perhaps the most promising field for electric shovels is in connection with electric traction lines, where electric power is usually available at a very low rate. For this service they are mounted on standard gauge trucks equipped with air brakes, and may be hauled on the regular tracks, or may be equipped with a trolley and made self-propelling, the maximum speed being about 5 miles per hour. Great economy can also be effected by the use of electric shovels in any territory where coal is hard to procure and water power is comparatively cheap, as experience has shown that with current at [illegible] cents per [illegible], or [illegible], their cost of operation is only about half that of steam shovels. And as part of this saving is obtained by decreased labor costs, and the cost for power is only about one-third the total cost of operating the shovel, local circumstances may determine a saving at considerably higher power rates.

The Pacific Coast Construction Company has [illegible] with the city of Victoria, B.C., for the sum of $2,900 in payment of extras incurred on sidewalk construction. The amount claimed originally and which the city declined to pay was $3,000

A Concrete-Protected Water Tank

Before the National Association of Cement Users, Mr. Emil G. Perrot (Philadelphia) read a paper entitled, "An Incident of Value of Concrete in Reducing the Cost of Insurance." Mr. Perrot's firm had occasion recently to build, in the city of Camden, N.J., an elevated water tank resting upon a tall structural steel tower. This tank was in the heart of the city immediately adjacent to two business properties, the owners of which were somewhat fearful of the disastrous effect which might follow an adjacent fire and the possible collapse of the tower. It was found that the insurance rates on this structure, with its unprotected steel column legs, would amount to about $500 per annum. It was figured, however, that each of the columns and horizontal members of the tower could be encased in concrete at a total expense of $4,000. This fireproofing was thereupon done. It will be noted that the $4,000 cost of fireproofing means an annual expense of $240 at a 6 per cent. interest rate, whereas the insurance of the tower would have cost $500. In addition, it is probable that the tower is so fireproof that a fire in one of the adjacent buildings would not harm it, although, if it had been left unprotected, the damage to the surrounding structures might have been very great. The total cost of the tower, with its fireproofing was apout $13,000.

Mill Building vs. Reinforced Concrete

At the annual convention of the National Association of Cement Users held in New York December 14-20, Mr. J. P. Perry (New York City) read an interesting paper entitled, "Comparative Cost of Maintenance of Various Types of Building Construction." He assumed, in the first place, a building with an original cost of approximately $100,000, and on this basis figured out the relative annual costs of the two types of buildings. It is probable that the first cost of the concrete building would be some 10 per cent. greater than that of the mill building. In the maintenance, however, the concrete building would save money on account of the minimum amount of vibration, the ease with which it can be lighted, the reduction in its insurance and its freedom from vermin. The ordinary concrete building has a window percentage of the outside wall of from 70 to 80, whereas the ordinary mill building has only 30 to 40 per cent. This additional window space affords a much lighter interior and thereby allows the workmen to do much more work. Of late, the insurance rates on concrete buildings and on their contents have been much lower than similar rates on mill buildings. In regard to vibration, it has been the experience of owners of concrete buildings that a considerable saving has been noted each year on account of the better condition of the machinery due to the stability and lack of vibration in the concrete building. One owner, for instance, who has similar machinery in a concrete and a mill building, has noted that the maintenance of machinery in the vibrating mill building amount to some $5,000 a year more than in the non-vibrating concrete building. Finally, in any building with perishable contents the loss from vermin is appreciable, and this loss, it is quite probable, can be avoided in concrete structures where the vermin find it hard to exist.

Assessing to each of these above items an approximate based on letters which he had written to some 25 architects and owners, Mr. Perry finds that the annual charges on the two buildings, capitalizing the first cost at 6 per cent., would amount to $11,000 in the case of the mill building and $9,000 in the case of the concrete building.

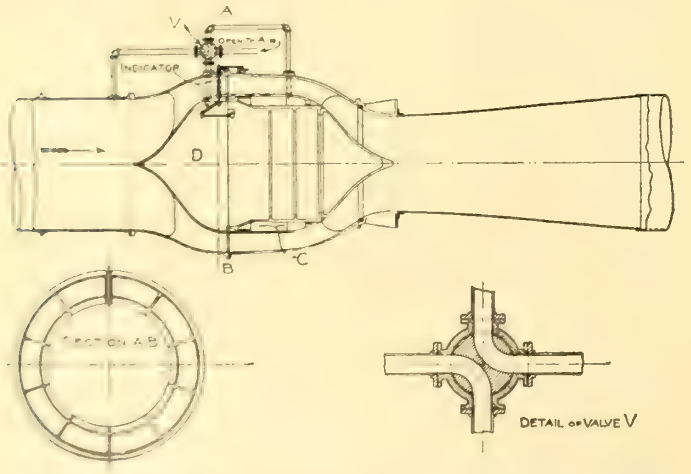
In the discussion, Mr. W. H. Ham (Boston), said that in a [illegible] he had observed that in the summer the temperature in a concrete building was some 10 degrees lower than in an adjacent mill building and in the winter some 10 degrees higher. While the difference in temperature in the winter [illegible] small difference, as the building was [illegible] from waste steam, the lower temperature in the summer certainly added considerably to the capacity of the workmen. Mr. Walter F. Ballinger (Philadelphia) stated that in his observation this lowering of summer temperature and raising of winter temperature was not true for concrete buildings, but it was noted afterward by another speaker that once the building was heated in winter the amount of heating necessary to maintain an even temperature was considerably less than in a wooden building. Mr. Ham further noted that the companion of mill buildings with concrete buildings should take account of the fact that mill buildings are generally designed for light loads, say, 60 lbs. per square foot, whereas in most cities the lowest load for which the regulations allow a concrete building to be designed is 150 pounds per square foot. He also noted that concrete buildings can have longer floor spans than mill buildings, which sometimes brings about a saving in the disposition of the machinery. Mr. L. C. Watson said that in his experience Mr. Perry's assumption that a concrete building would cost 10 per cent. more than a mill building did not always hold. He had found that for loads under 200 pounds per square foot the mill construction was cheaper, but for loads above that amount the reinforced concrete was as cheap or cheaper than the mill construction.

Pressure Valve for Control of Water Flow

Gives Perfect Control—Operated from Any Distance—Ideal Shape for Cheap Manufacture — Model Operating at Niagara Falls

The accompanying sketches illustrate the construction and plan of operation of a new pressure valve now being tried out by the Ontario Power Company's works, Niagara Falls, Ont. The valve is the invention of Mr. R. D. Johnson, hydraulic engineer, of the Ontario Power Company. The English patents have been taken out by Mr. Johnson in partnership with Mr. Boving, of the Jens Orten-Boving Company, which company will exploit the valve in Europe and Canada. For the United States the inventor intends to retain the patents in his own name. The model now in operation at Niagara Falls is working with entire satisfaction and its combination of simplicity and efficiency is calling forth warm expressions of praise from the engineers who have witnessed the demonstration. The descriptive matter which accompanies the cuts will, it is believed, be found amply sufficient to explain the operation of the valve.

A number of the advantages which may, we believe, be justly claimed for this valve are given below. The advantages are apparently equally applicable to all sizes and to all pressures.



Indicator may be attached to control valve to exclude possibility of main valve creeping from any desired opening.

If water is free to flow when main valve is open chamber "C" may be omitted by merging it into chamber "D." Its presence is desirable as an efficient factor of safety.

The valve "V" in the position shown reduces the pressure in the annular chamber "C" to atmospheric and main valve closes due to full pressure transmitted into cnamber "D." Reversing the control valve, reverses the pressure and main valve opens.

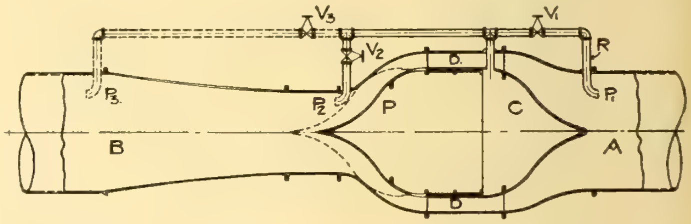
1st. All cross sections are circular, which is the ideal shape for cheap manufacture and minimum material to take care of stresses.

2nd. Perfect control, doing away with motor drive and multiplicity of gearing necessary to move a large gate valve.

3rd. Balanced pressures, avoiding any tendency to wear or cut. That is, the water pressure does not affect the sliding friction.

4. The venturi outlet recovers the head due to the increased velocity at the neck of the valve and the smooth flow makes the loss of pressure about 10 per cent. as much as in the ordinary valve.

5th. Applicability to remote control. It is quite as safe to operate this valve from a point a mile away as along side of it. This may be accomplished in many ways by electrically actuating the small control valve.



Operation, Flow from "A" to "B"—The operation of the valve is due to difference of pressures caused by changes in velocity of the water in the valve case (venturi effect).

Opening Effort—The start to open is due to the static pressure on the submerged surface of the plunger above the valve seat.

Closing Effort—The closing effort equals the static pressure inside the movable plunger.

To Open Valve—With the connections shown in solid lines and flow from "A" to "B" with or without pitometer tubes P1-P2. To open valve: close control valve V1 and open V2.

Operation, Flow from "B" to "A"—With the flow from "B" to "A" pitometer tubes or additional connections shown in broken lines are used. Opening and closing efforts—same as above.

To Open Valve—Open V1 whilst remaining valves are closed.

To Close Valve—Open V3 or V2 whilst remaining valves are closed.

Opening Without Connection "R"—With the flow from "B" to "A" and connections shown in solid lines valve may also be opened without connection "R" to downstream end of valve case by closing V2, as sufficient water will leak through packing of plunger to allow valve to open.

Closing Without Connection "R"—Under above conditions valve may be closed by opening V2 and using pitometer tube "P2" thereby obtaining the dynamic effect of the water. Or valve may be closed by opening "V3" and using connection shown in broken lines without using pitometers.

6th. This valve requires no by-pass to equalize the pressure on both sides of the gate previous to opening.

Selection and Maintenance of Pavements

Noise, Sanitariness and Durability as Elements of Choice—When to Relay Asphalt Pavements—Organization of Repair Force—Cost of Repairs

Under the title "The Street Pavement Problem in the Borough of Manhattan," Mr. George W. Tillson, Chief Engineer of Highways of that borough, presented some interesting facts and ideas before the Municipal Engineers of the city of New York at a recent meeting of that society. Much of this applied largely to local conditions only; but we quote below certain portions which were of value to municipal engineers generally.

Choice of Pavement.

First stating that Manhattan has adopted stone block, asphalt block, sheet asphalt and wood block as its standard pavements, he discusses the matter of selecting one of these for a given street, as follows:

For heavy traffic streets where the pavement is in constant use under all weather conditions and where the question of noise is not important, a well-laid granite pavement will be most satisfactory. But suppose, for instance, that such a street passes a hospital and it is necessary to reduce the noise to a minimum, then a change must be made. Under such conditions, where the grade is less than 2 per cent., the author would always recommend wood block. On steeper grades asphalt, sheet or block, to about 5 per cent., when a return must be made to granite. The problem then is to use this material in such a way that it will produce the least possible noise under traffic. It is a well known fact that American stone pavements are inferior to European more on account of the character and shape of the blocks themselves than the material. If, then, the blocks are so dressed that when laid the surface of the pavement shall be smooth and the joints between the blocks so small that it is practicable to fill them with a bituminous compound, the noise element will be eliminated to as great an extent as possible.

If, on the contrary, the traffic on a street be heavy, the question of noise on its entire length all-important and the grades below 2 per cent., the material to be used is undoubtedly wood block.

On light traffic, business or residential streets, either asphalt or wood can be used according to local wishes within grade limitations. It must be remembered, however, that on streets not in continuous use grade restrictions need not be so strictly adhered to, as on the comparatively few days when smooth pavements are unduly slippery they can be avoided to a great extent. To sum up briefly, then, the principles governing the selection of materials for different streets, one would say, first, for heavy traffic wholesale streets, granite block; second, for heavy traffic streets where noise must be eliminated where possible, wood block, asphalt-block, or improved granite, according to grades; third, for light traffic, or residential streets, asphalt or wood, according to local desires.

The above conclusions have been reached by taking into account the effect of using materials that do not contain all the requisites previously stated so as to produce the best results. For instance, granite is durable, fairly smooth when well laid, but so noisy as to prohibit its use on certain streets. Wood block is smooth, durable and almost noiseless, but slippery under certain conditions. Asphalt is smooth, less slippery than wood block, and also less durable than either wood block or granite. With well-laid granite there is not much difference in the maintenance of either of the above kinds.

It has been considered that a smooth pavement should always be laid whenever conditions are such as to permit it.

It will be noticed that up to the present time no mention has been made of the cost of the different kinds of pavement. The reason for this is that the author believes that in the borough of Manhattan the pavement best adapted to any one street should be used irrespective of its cost.

In deciding specifically upon the material for any particular street the question of cost sometimes comes up and may be an important factor in reaching a decision; then the first cost and frequently that of repairs must be taken into consideration. Interruptions to traffic are very objectionable and should be reduced to a minimum. Streets are in use at all times and under all weather conditions. If a pavement be put in good condition and then weather conditions arise so that it is not possible to make repairs for three months, for instance, and in the meantime it becomes bad and in a general state of disrepair, it can safely be admitted that it has not been constructed of proper material. This last principle is important in making the decision. From all reports it is probable that the pavements of the cities of London and Liverpool are kept in better condition than those of any other large city. It would be of the greatest importance to know whether this is due to a more intelligent selection of material, better construction, or a more uniform and systematic method of making repairs. It is very likely due to all three, and a study of this would undoubtedly be of great value to American cities.

The damage to pavements is the actual wear and tear of street traffic and by extraneous causes. The first is provided for by repaving certain streets and repairing others. The selection of the streets to be repaved and the material to be used is a work requiring great care, judgment, and a complete knowledge of the requirements of each street. In order to do this intelligently and systematically a traffic census should be taken of all the business streets so that the engineer would have positive and specific instead of general knowledge of the existing conditions. Many claims are made of the needs of certain streets by interested parties which are entirely without foundation, and the engineer often requires positive facts to refute them.

When to Relay Asphalt.

An asphalt pavement in bad condition is generally full of holes with the asphalt worn down to the foundation. By patching the holes it can be put in good repair till after a certain time more holes occur and they must again be patched up. The frequency of this work and the cost of same will determine when the pavement should be entirely relaid. The entire expense of maintaining a pavement, no matter how its initial cost has been met, consists of this initial cost, the interest on same, the cost of repairs, and the establishment of a sinking fund that will be sufficient to replace it when it becomes worn out.

Putting this into the form of a formula it will be

$$A+C\,I+\frac{R}{N}=\text{annual expense,}$$

when N=life of pavement,
C=cost per square yard,
I=rate of interest,
R=total cost of repairs,
A=sinking fund to be paid each year to equal C at end of N years.

It follows, then, that [illegible] should be kept of the cost of repairing each street each year, as it often happens that a large amount of repairs made one year will materially reduce the cost in succeeding years. While all [illegible] amount of [illegible] they are [illegible]. In other words, the entire history of each street [illegible] be accurately kept. Applying the figures previously [illegible] [illegible] to this formula, the annual expense of maintaining an asphalt pavement is twenty five cents. Consequently when the annual cost of repairs on any particular street reaches this amount the question of its repaving should be carefully considered. This is an average result, but knowing the age of a particular pavement and its repair cost, by the application of the formula it can be determined positively whether, from a financial standpoint, it should be repaved or not. This would seem to demonstrate not only that it can be accurately and scientifically determined when an asphalt pavement should be relaid, but that this is difficult to determine in any other way. Where a city charter requires that repaving shall be paid by special assessment and repairs out of the budget account, this determination is important.

Asphalt Repair Methods in Manhattan.

This work consists of keeping in repair all of the asphalt paved streets, sheet and block, both under and out of guarantee, a total, as has been previously stated, of 305 miles.

The out-of-guarantee, or maintenance streets, as they are called, are repaired by contract and paid for per square yard of pavement laid.

In order to facilitate the entire work the borough is divided into six inspection districts. These sections are divided into divisions, generally six, each division being in charge of an inspector and each section being in charge of a chief inspector. The division inspectors report to the chief inspector, who in turn reports to the assistant engineer in charge.

The division inspectors patrol their divisions daily, making notes of all defects in the pavement from whatever cause, whether by wear and tear, fire, plumbers, corporations, water department or builders. These are all located and recorded on a prepared blank which is forwarded to the main office. The clerk in charge of this branch sends to each contractor a copy of the list when the same refers to a guaranteed pavement. The maintenance streets are looked after directly by the engineer in charge.

In addition to the above, on Friday of each week the chief inspectors report to the engineer all streets in their respective districts that are in disrepair. These lists are also sent to the contractors and each one is expected to repair all the streets on his list before the end of that week. This plan has been in effect for about three years and has produced admirable results. The author believes it is impossible to keep the streets in good condition without a competent and systematic inspection.

In compiling statistics of the repairs to asphalt pavements in different cities the unit has generally been the cost per square yard. This, while somewhat satisfactory, is not entirely so, as the cost of doing the same work varies considerably. If, however, the percentage of the maintained pavement actually removed be given, an exact comparison can be made. The following figures have been made up by both plans and relate to the repairs of sheet asphalt pavements out of guarantee in the borough of Manhattan during the last five years, the figures for 1910 being estimated:

	Percentage of pavement removed.	Cost per sq. yd. in cents.	Cost per sq. yd. actually repaired.
1906..................	23	34	$1.48
1907..................	18	20	1.11
1908..................	15	17.7	1.18
1909..................	12	11.7	.98
1910..................	13	11.3	.87

It would seem from the above figures that the limit of the reduction had about been reached.

It seems impossible to obtain reliable figures as to the cost of keeping streets in repair. The amount of money spent in the different cities for such purpose can be learned, but that is a different proposition, as probably no American city spends enough to keep its streets in good condition. In speaking of this an official of a neighboring city said to the author: "We spend all the money we can get, but it is not enough for our purpose." It will be seen, then, of what little value such information is.

Use of Binding Materials

The principal objective points in the science and art of highway engineering at the present time are, first, the economical construction of roads which will withstand the disintegrating effect of excessive motor car traffic and excessive horse drawn vehicle traffic, and second, the elimination of the noxious dust.

The standard method used during 1909 on the state highway system of Rhode Island in the endeavor to accomplish the above results was the construction of bituminous pavements by the hand mixing method using as a binder in the mix 50 per cent. Texaco asphalt, grades No. 55 Special and J, and 50 per cent. Providence coal gas tar, and a flush coat of Texaco asphalt or Providence tar. The present practice is the result of experimental work conducted during 1906, 1907 and 1908 with various bituminous materials used in different methods of construction. It has been demonstrated that, under average conditions, if the traffic consists of 90 to 95 per cent. of motor cars, the flush coat is not a necessity.

Experimental work with the American Tar company's tar coating machine showed that the machine was economical in operation and satisfactory in the results produced, the superior quality of the mix as compared with the results of hand mixing being especially apparent during the cold periods of the working day after the first of October.

The following problems, some of which are of paramount importance, especially to those who are using the mixing method, should be carefully considered:

The relative merits of three methods of paying for bituminous macadam construction: first, materials and labor being paid for directly by the party of the first part; second, the extra labor involved in the construction of a bituminous pavement being paid for under the extra work clause common to many specifications, while the bituminous material is purchased directly from the producer by the party of the first part; third, the pavement being constructed for a contract price per square yard, under which method the bituminous material is furnished in accordance with rigid specifications.

The economics and relative advantages of hand mixing and machine mixing.

The economics and merits of heated stone used with tars, asphalts, soil at ordinary temperatures, and with asphaltic compounds.

The relative merits of the mixing and penetration methods of constructing bituminous macadam pavements.

The development of specifications covering the chemical and physical properties of bituminous binders through the medium of an exhaustive study of the character of the various component elements, the effect of each on the adaptability of the material for use as a binder under given conditions, and the requisite maximum and minimum percentages of each constituent. Results will be accomplished more expeditiously by a national organization investigating the problem in each country in which a large amount of bituminous work is being done than through the medium of an international body.

The restriction of the term "bituminous macadam pavement" to designate macadam roads built with a bituminous binder in which the bituminous material forms a bond between the surfaces of the stones composing the No. 2 course, while the term "bituminous surface" can be used to designate the surface of a road or street, which is covered with a thin coat of bituminous material.

Use of Concrete Piles at Prince Rupert

Concrete piles are being used in the Government wharf at Prince Rupert, B.C. The Westholme Company have the contract. From details furnished by them we learn that each pile is sixteen inches square. The centre is perforated by a steel pipe which runs right through. This is for extracting all the matter between the bottom of the pile and the solid rock. Round the tube are placed four reinforcement girders which play the part of grapplers. In order to render them immovable they are circled by stays at intervals of five feet. Outside these steel ribs is placed a closely latticed network of wire to give the concrete a groundwork. A huge derrick is now in readiness to place the piles in position, a task that will entail a considerable amount of power as the average weight of the piles is about sixteen and a half tons. The main piles will be supplemented on either side with other piles placed at a tangent, thus forming a support.

The test borings for the piers of the protected bridge across the Second Narrows at Vancouver are about completed and plans will shortly be prepared as a preliminary to taking tenders for the piers and abutments. According to President McNaught, of the Burrard Inlet Tunnel & Bridge Company, detailed plans and specifications for the superstructure of the bridge are practically finished, the type of bascule alone being undetermined. The plans show the longest span of the bridge to be 450 feet, and that extends over the greater portion of the deep water channel not covered by the 150-foot draw span. According to information received by Mr. McNaught from Contractor Owens, who has charge of the test boring, there is every indication that good bottom for the piers can be secured without going to any great depth along the north shore. Test borings made over a year ago showed that there is solid rock foundation available with very little excavation from mid-channel to the south shore.

The C. P. R. subway at the head of the St. Lawrence Boulevard, Montreal, is now practically completed. The subway is 900 feet long, and at its deepest point dips 15 feet below the level of the street, it is 60 feet wide and in the excavation work, 20,000 cubic yards of earth and 7,000 cubic yards of stone were removed. On either side are 17½-foot sidewalks, leaving space in the middle for two car tracks and two traffic roadways. A nice finish is given to the work by a heavy concrete balastrade. This runs the whole length of the retaining walls, and is made of reinforced concrete. Altogether, in the walls and balastrade about 3,000 cubic yards of concrete were used. The bridge over the subway is built of steel and has an entirely fireproof roadway. It is 65 feet wide and 155 feet long and carries four tracks.

Excellent building conditions have been prevailing at Calgary, Alta. A number of structures were started during the Christmas season. The best building weather experienced at this season for years is reported.

City Building Inspector Snook, of Toronto, has been appointed a Justice of the Peace by the Ontario Government. One is not likely to forget his appointment as his initials are also J.P. Rather an odd combination—J. P. Snook, J. P.

Building permits issued at Winnipeg up to the end of November totalled $11,136,200, as compared with $9,192,000 for the corresponding period of last year. Last month permits totalled $371,200, as against $291,800 for November

LEGAL DEPARTMENT

Information for this Department is requested from Architects, Engineers, Contractors and Builders. Send in the particulars of recent cases in which you were interested giving the main facts tersely.

Onus of Risk in Dangerous Employment.—Hunter vs. Hamilton Bridge Company. This was an action to recover damages for the death of one Hunter alleged to have been caused by the negligence of one or both of the defendant companies, the Hamilton Bridge Works Company and the Hamilton Steel Company. The Court found that the plaintiff failed:

(1) Because there was no evidence upon which the jury could find an obligation on the part of the bridge company to employ a "look out man."

(2) Because there was no evidence that the failure to employ a "look out man" caused the accident.

(3) Because, upon the undisputed facts, the only proper inference was that knowing the dangerous nature of the employment the deceased voluntarily undertook the risk.

(4) Because upon the undisputed facts the accident was solely caused by negligence of the deceased himself. The man was in a position of safety so long as he did not place himself in the way of the moving cranes—he knew his peril and it was his duty not to forget the passing cranes, and so place himself in a position where death was almost certain. Forgetting may not be negligence in some circumstances, but where a man voluntarily places himself in a position calling for the exercise of extreme care in some particular respect—he must not forget or it is his own negligence that causes the accident.

The action was dismissed without costs.

Contract as to Party Wall.—Sterling Bank vs. Ross, Divisional Court of Ontario.

Plaintiffs and defendants owned a party wall. By a survey of the town it was found to encroach 20 inches on the public street. The survey permitted then existing buildings to remain until they were rebuilt, etc. Defendant's building having been destroyed by fire she desired to rebuild, and the town council required her to conform to the statute. Defendant desired to remove 20 inches of the party wall standing on the highway in front of her new premises so as to enable her to extend the front of her new building across the full width of her lot. Plaintiffs asked for injunction to restrain defendant from interfering with said wall.

Mr. Justice Middleton held that the wall in question constituted an integral part of each building and could be maintained so long as either building is entitled to remain upon the highway. Injunction granted plaintiffs with $80 costs.

Divisional Court dismissed defendant's appeal from above judgment with costs.

Liability of Municipality.—Gamble vs. Townships of Vaughan and Markham Divisional Court of Ontario. Plaintiff brought action to recover $3,000 for damages caused by an explosion of dynamite used by a contractor for the Township of Vaughan in a gravel pit adjoining the plaintiff's house. At the trial, judgment was given for $570 and costs. The Divisional Court dismissed both defendants' appeals with costs, also plaintiff's cross appeal to increase the amount of damages.

Mr. Kenneth Chestnut, C.E., spent Christmas at his home at Fredericton, N.B. Mr. Chestnut has been in charge of some 800 miles of track on the G.T.P. Railway as chief inspecting engineer, with headquarters at Edmonton. He is to be transferred shortly to the Rocky Mountain division of the [illegible]

The building permits issued at Montreal during 1910 totalled nearly $16,000,000, double the amount expended during 1909.

Canadian City Engineers

Georges Janin, Montreal, Que.

Mr. Georges Janin, who has been apointed general municipal engineer for the city of Montreal, was born at Poicters, France, in 1853, and came to Canada in 1892. With an extended knowledge of municipal engineering work he quickly acquired a wide reputation in his new sphere. One of Mr. Janin's earliest interests was the protection of running waters from sewage pollution. In his official reports he emphasized the necessity for introducing the system followed in Europe and the United States. Mr. Janin outlined his views on this subject at a conference held in Montreal in 1896, and received the support of the Provincial Board of Health. The St. Laurent College subsequently authorized Mr. Janin to undertake a sewage farm enterprise, and after his first experiment the city of Montreal entrusted to him a similar enterprise to utilize the sewage of St. Denis' ward.

In 1898 Mr. Janin entered the service of the city of acting superintendent of the aqueduct system, during the illness of the superintendent at that time. He was afterwards appointed assistant superintendent, finally assuming the direction of the Water Department, a post which he has continued to occupy since. The Provincial Board of Health also recognized his experience by appointing him consulting engineer to their Board.

City Engineer Janin of Montreal

Mr. Janin has been identified closely with practically all the important works carried out in Montreal in recent years. Of these perhaps the present extensions to the waterworks are the most noteworthy. City Enginer Janin is progressive and thorough and the creation of his office is expected to mark the opening of a new era in civic improvement at Montreal.

Personal News and Notes

The annual banquet of the Montreal Builders' Exchange was held at the Windsor Hotel on Wednesday, Dec. 18.

Peter Lyall, head of the Montreal contracting firm of Peter Lyall & Son, has been elected a director of the Sterling Bank of Canada.

Charles Sharpe, contractor, leaves Winnipeg shortly for Proctor, on the Kootenay lakes, British Columbia, where he is erecting a large tourist hotel for the C.P.R.

The Undergraduate Society of the Department of Applied Science at McGill University, Montreal, was addressed last Monday by Dr. James Douglas, New York City, past president of the American Institute of Engineers, and Mr. James White, Secretary of the Commission of Conservation.

Mr. W. Stewart, of the firm of Foley, Welsh & Stewart, who left recently for Scotland, is stated to be planning to bring 5,000 laborers back with him to build the section of the G.T.P. through the mountains, for which his firm has the contract. There is little labor available on the Pacific coast and the importation of Asiatic labor will not be sanctioned by the Government.

Mr. F. W. Ellingwood has been appointed superintendent of construction for the C.P.R. terminals with headquarters at the Windsor street station, Montreal. Mr. Ellingwood, who was formerly connected with the Pennsylvania Railway in connection with its big terminal scheme in New York, will have charge of the construction of the Windsor street station, and also, it is understood, of the terminal scheme of the company at the Place Viger station.

According to a dispatch from Ottawa, a difference of opinion is stated to have developed among the commissioners of the Quebec bridge over the awarding of the contract for the structure. Two of the commissioners are understood to favor the acceptance of the Canadian tender, which is made by the Canadian Bridge Company of Walkerville, and the Dominion Bridge Company, of Lachine, working in combination. One of the commissioners is said to favor the acceptance of the tender made by the British company. It is expected that a settlement will be reached very shortly.

We have received from Messrs. W. & L. E. Gurley Troy, N.Y., manufacturers of civil engineers' and surveyors' instruments, a copy of the 45th edition of their manual. This manual will be found indispensable to the profession. It is primarily a book of instruction in the adjustment and use of field instruments. It is comprehensive but, at the same time, concisely arranged. The object kept in view by the compilers was simplicity and the avoidance of such matter as should be discussed in technical publications.

The B. Greening Wire Company, Hamilton, Ont., have favored us with a good plain office calendar for 1911. The calendar shows an excellent view of the company's extensive plant, where wire work of every description is manufactured. Photos of four generations of the Greening family are shown, the first being Nathaniel Greening (1799) and the last the present managing director, Mr. H. B. Greening. The eastern depot of this firm is 422 St. Paul street, Montreal, Que.

According to a despatch from Montreal, the National Bridge Company has just been incorporated, with a capital of $1,000,000.

Mr. J. E. Schwitzer, assistant chief engineer of western lines, has been appointed chief engineer of the C.P.R. with headquarters in Montreal.

The steel construction at the Windsor station extensions, Montreal, has now reached the sixth storey and the masons have started work placing the granite facing stones in position.

Convention of the Can. Soc. C.E.

Arrangements for the above meeting at Winnipeg (January 24 to 27), are now maturing and the programme will be issued early in the new year.

The meetings will be held at the Alexandra Hotel, which will be the headquarters of the executive during the session.

Eastern members will leave Montreal, Ottawa and Toronto on a special train on Saturday, January 21, and will return by a train expected to reach Montreal at midday, on Sunday 29th, while special arrangements are being made for western members. Arrangements for excursions include visits to the city power plant at Point Du Bois, St. Andrews locks and the Grand Trunk Pacific shops.

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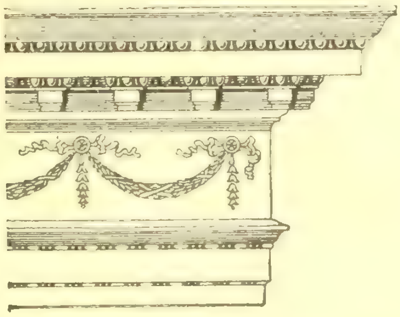

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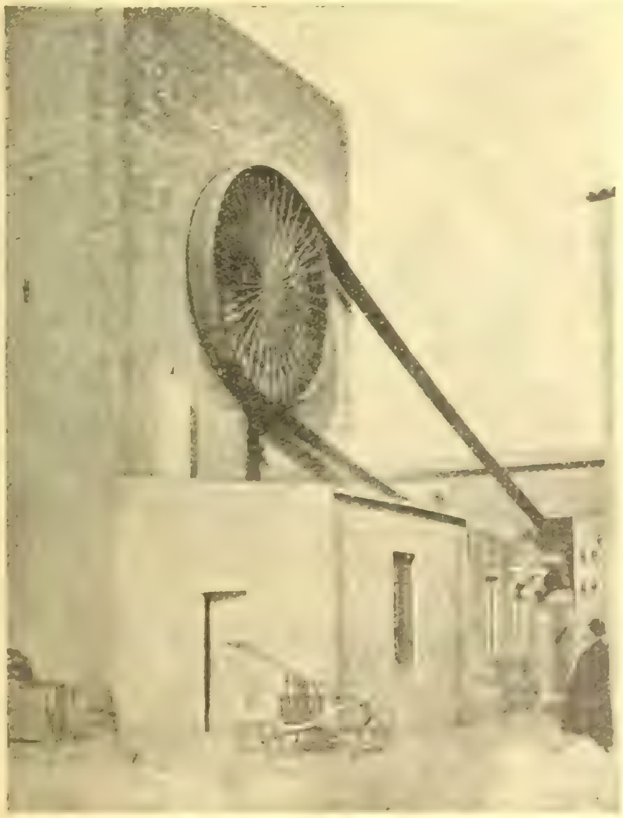

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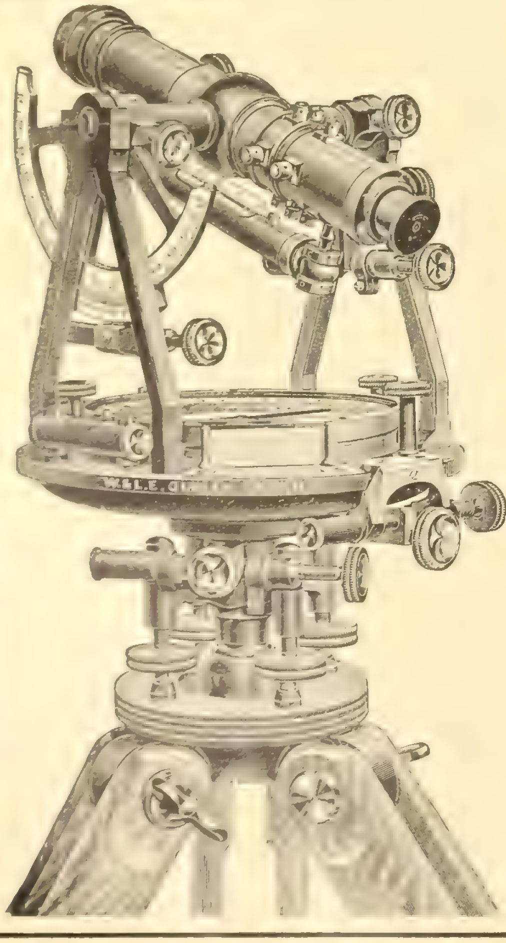

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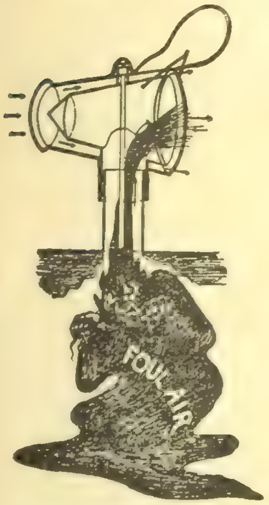

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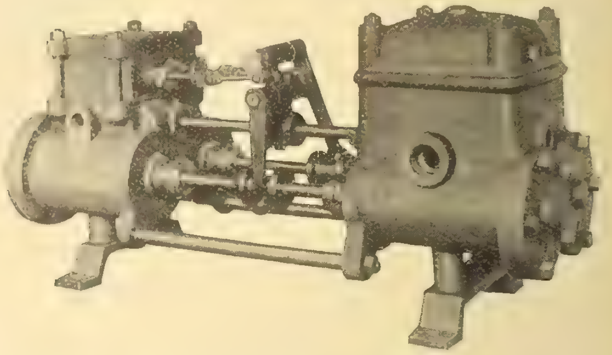

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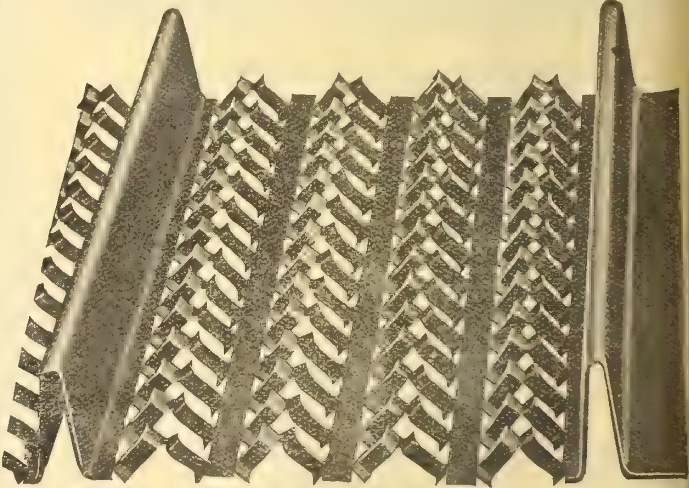

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1 dry pressed red brick	$18.00
1 dry pressed buff brick	18.00
1 Stock Bricks	12.00
y Stock bricks	10.00
re cut bricks for foundation work $10.00 to	11.00
ous terra cotta bricks	15.00
1 enamelled bricks, all colors, from $80.00 to	$150.00

WINDOW GLASS.

ollowing are the prices of glass at Toronto, ilton and London. These prices are f.o.b., h 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
to 25 united inches	$4.25	$ 6.25
to 40 "	4.65	6.75
to 50 "	5.10	7.50
to 60 "	5.35	8.50
to 70 "	5.75	9.75
to 80 "	6.25	11.00
to 85 "	7.00	12.50
to 90 "	...	15.00
to 95	...	17.50

Brass Goods, Valves, etc.

to 100 "	...	20.50
to 105 "	...	24.00
to 110 "	...	27.50

he following are wholesale prices for glass Montreal and jobbing prices at Winnipeg for lots:—

	Single Mont'l.	Single W'p'g.	Double Mont'l.	Double W'p'g.
u. i.	$4.00	$3.00	$ 6.75	$ 5.25
u. i.	4.25	3.50	6.75	5.50
u. i.	4.75	4.25	8.75	6.50
u. i.	5.00	4.75	10.00	7.50
u. i.	5.25	5.25	11.50	8.50
u. i.	5.75	6.00	12.50	9.50
u. i.	...	...	14.00	10.50
u. i.	...	...	16.50	11.50
u. i.	...	...	18.00	13.50
u. i.	...	...	20.00	16.00

0-foot boxes at Montreal, 25-inch Break, .0; 40-inch Break, $2.20. Montreal discounts ingle, 25 and 5 per cent. off; D. D., 40 and per cent. off. Winnipeg prices are net.

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or Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.
or Tile—½-inch square, 65 cents.
ll Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.
cous Tile—All sizes, according to color, 55 to 65 cents.
ed White, 6 x 3 inches, 55 cents per square foot.
t—Dull finish colors, first, 70 cents.
ping Coves and Corners, special quotations to suit requirements.
lite Tile—3-16 inch No. 1 standard, size 6 x 3 inches, 6 x 2 inches, 60 cents.
ite glass, installed, 6 x 3 inches, 30 cents.

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ndard compression work, 65 per cent.

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gallon, standard, $4.50; extra heavy, $7.00

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x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe.

d pipe, 80 per cent. off; lead waste, 80 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.50
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.
Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

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Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.
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Binder stone, $1.25 per ton, f.o.b. Toronto.
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Free stone delivered, 14 to $15 per toise.
Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
Brown sills and beads, in the rough, delivered, 35 cents per foot.
Rubble stone in car lots, $1.25 to $1.30 per ton.
Scotch fire brick, delivered, $30 to $35 per M.
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Pure Linseed Oil Putty, bulk, in barrels, $3.25 per 100 lbs.
Pure Red Lead, dry, $5.00 to $6.00 per 100 lbs.

The B.C. Gazette gives notice of the incorporation of the following companies: North American Lumber Company, Limited, capital, $100,000; Armstrong, Morrison & Co., incorporated to construct, carry on, etc., business as contractors, public and private works, etc., capital, $250,000; Pacific Oatway Fire Alarms, Limited, capital, $100,000; Rainy River Gravel Company, Limited, capital, $150,000; Western Engine & Supply Company, Limited, capital $250,000; Vancouver Sand & Gravel Company, Limited, capital, $20,000.

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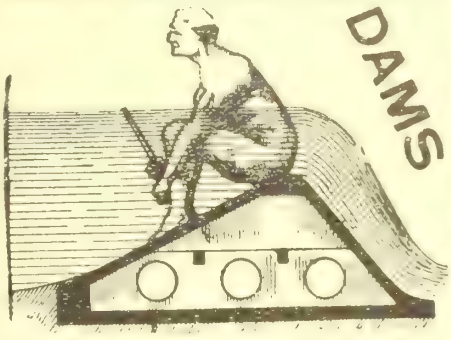

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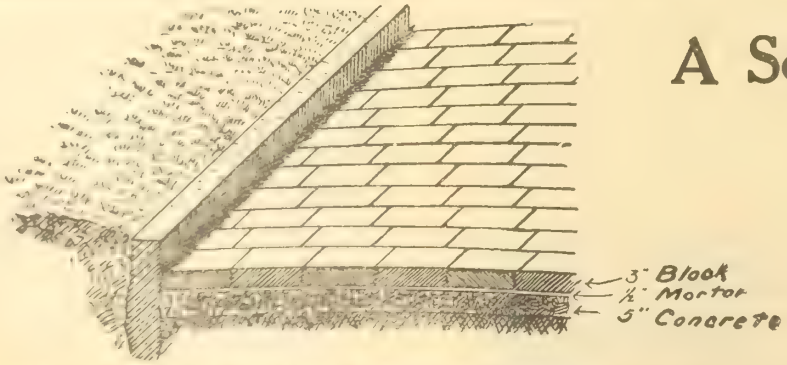

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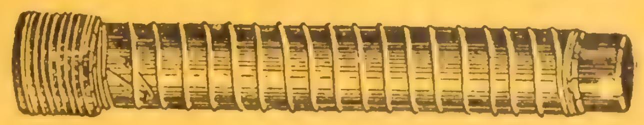

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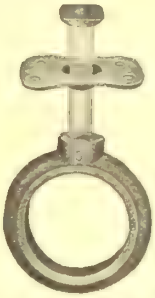

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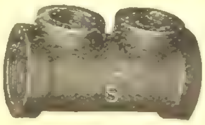

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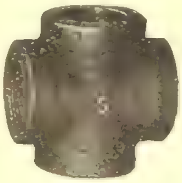

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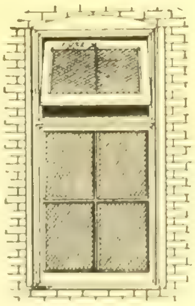

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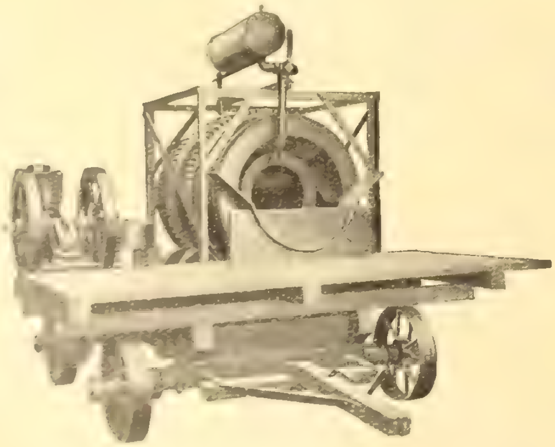

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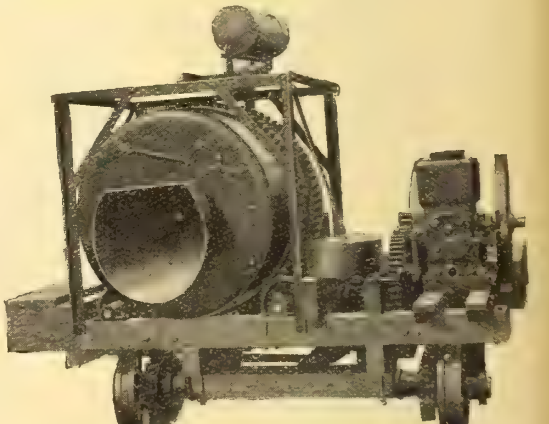

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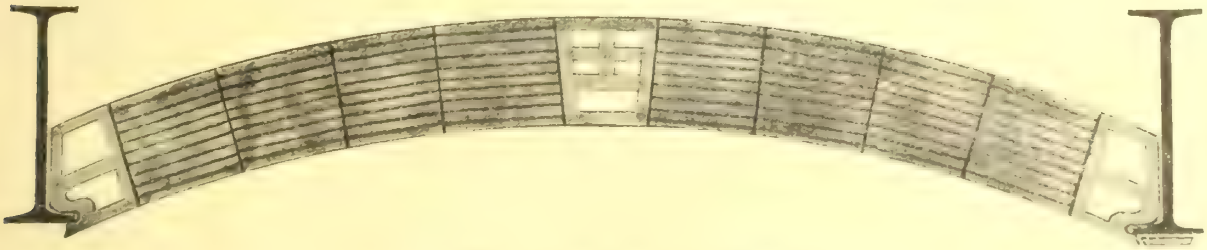

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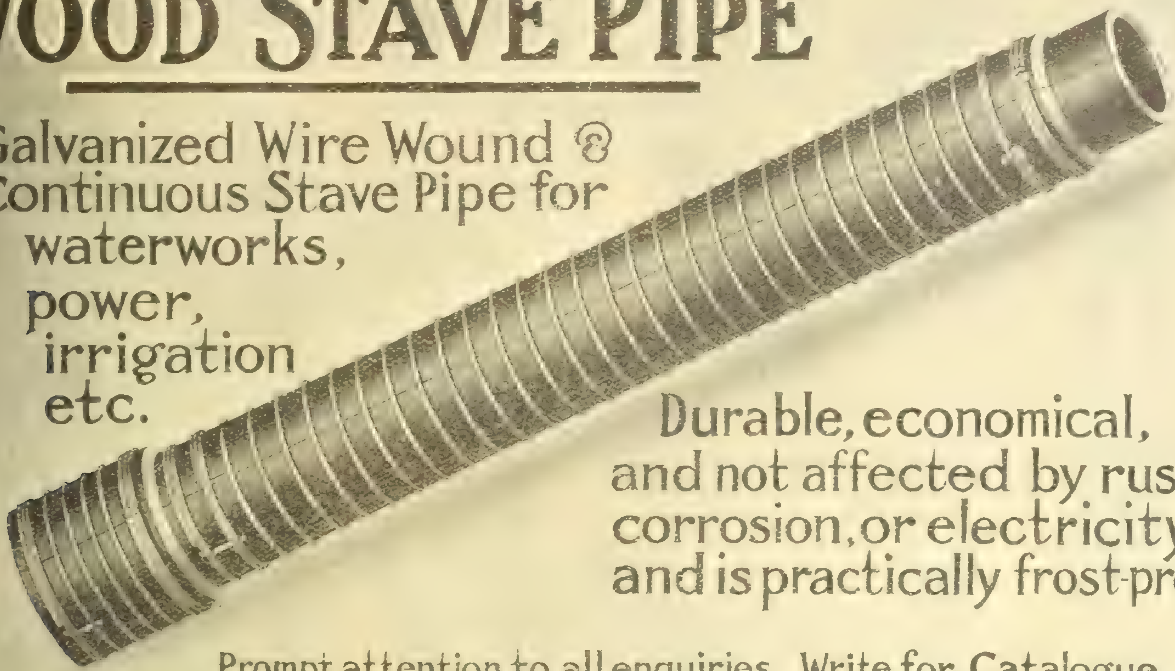

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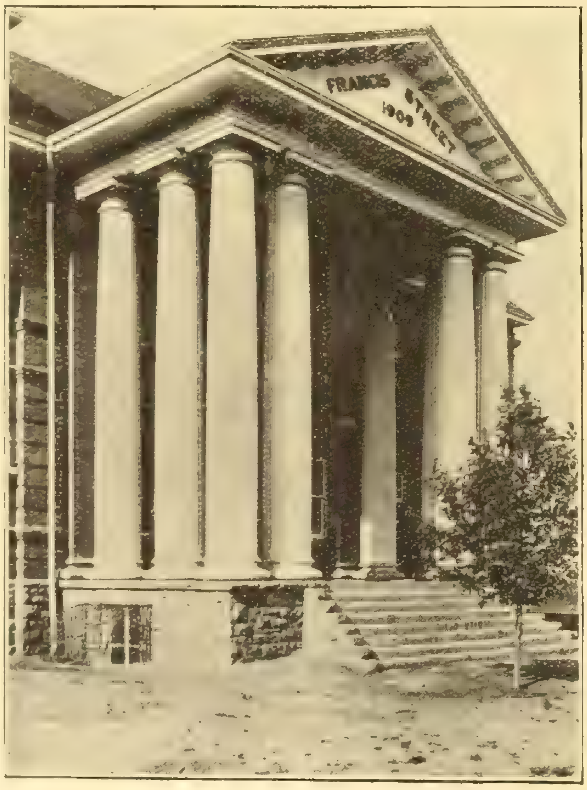

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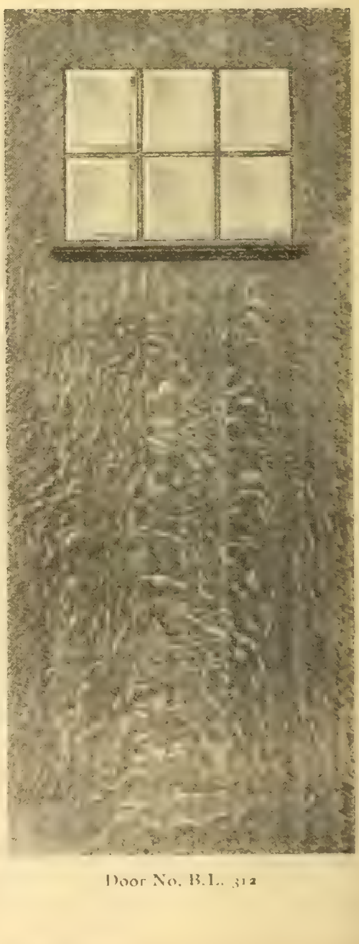

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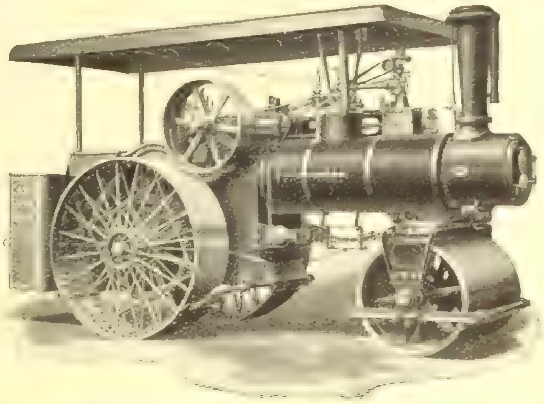

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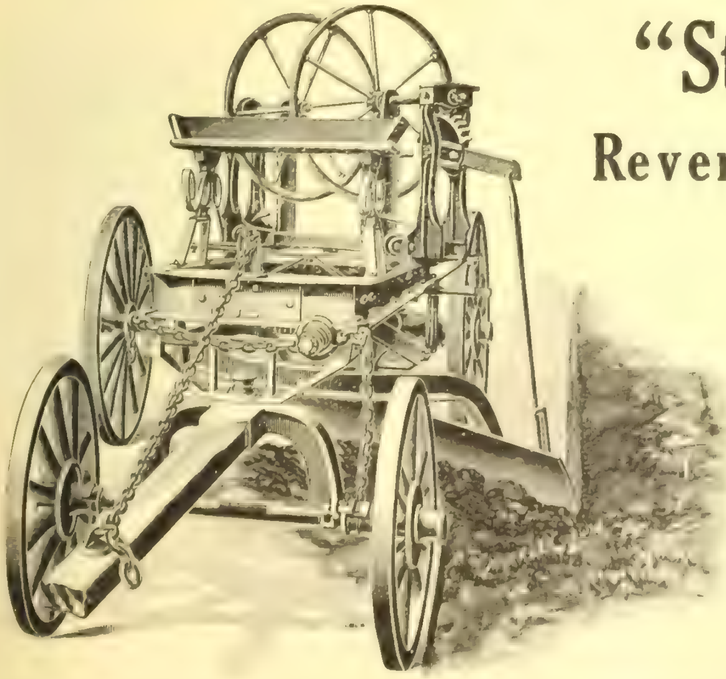

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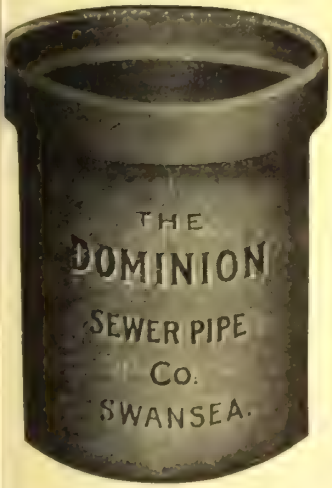

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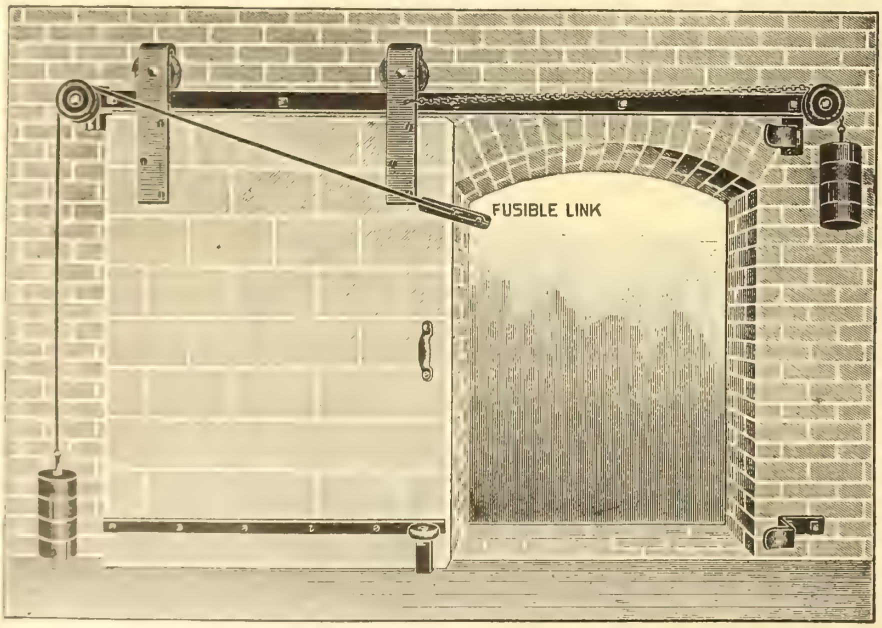

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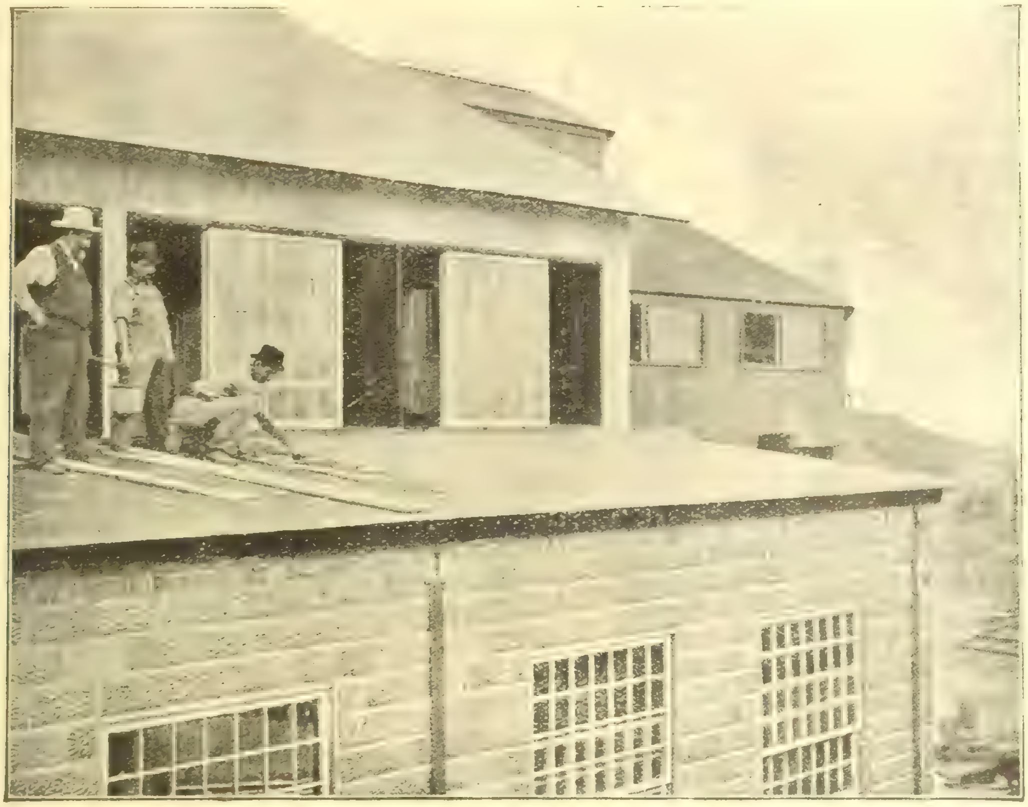

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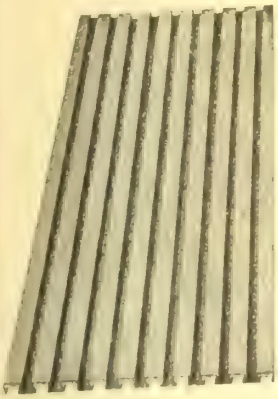

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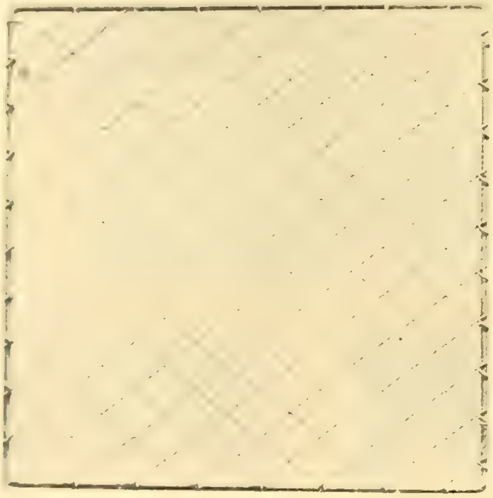

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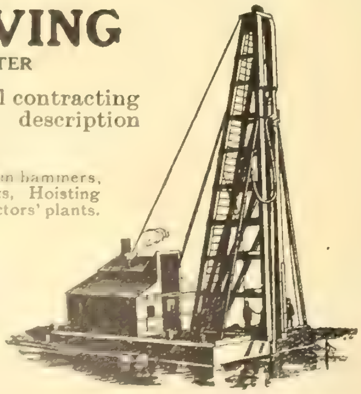

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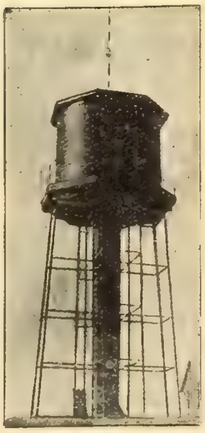

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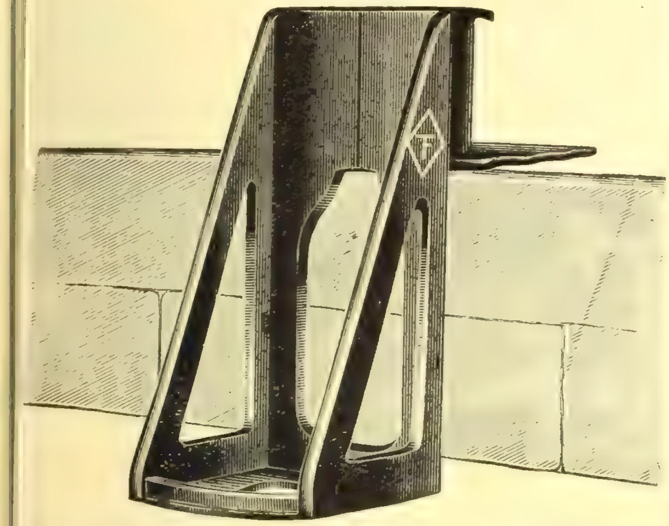

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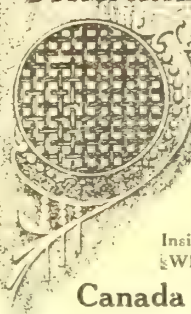

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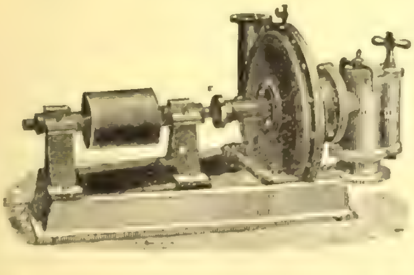

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[illegible]	Private Residences	1,023,050	70,300
58	United States Government	613,639	119,115
17	Cemeteries, Vaults, Tombs and Greenhouses	43,049	5,500
111	Athletic Clubs, Clubs, Universities, College and School Buildings	872,822	1,274,580
68	Hotels, Apartments, Restaurants and Supply Stores (Markets and Refrig'g Plants)	1,547,162	251,797
70	Pumping Stations and Power Houses	1,779,271	935,622
25	Natatorium Swimming Pools and Comfort Stations	281,682	59,923
41	Hospitals, Asylums, Homes	1,062,571	110,400
37	Private Stables	460,320	124,242
32	Railroad Stations and Subways	838,501	192,192
56	Mills and Factories	609,549	1,075,713
17	Police Stations and Fire Houses	208,664	28,837
650	Total 1st	12,800,281	4,660,766
	Total 2nd	4,660,766	
	Total 1st and 2nd	17,461,047	
61	Bake Oven Jobs	101,694	
717		17,562,741	

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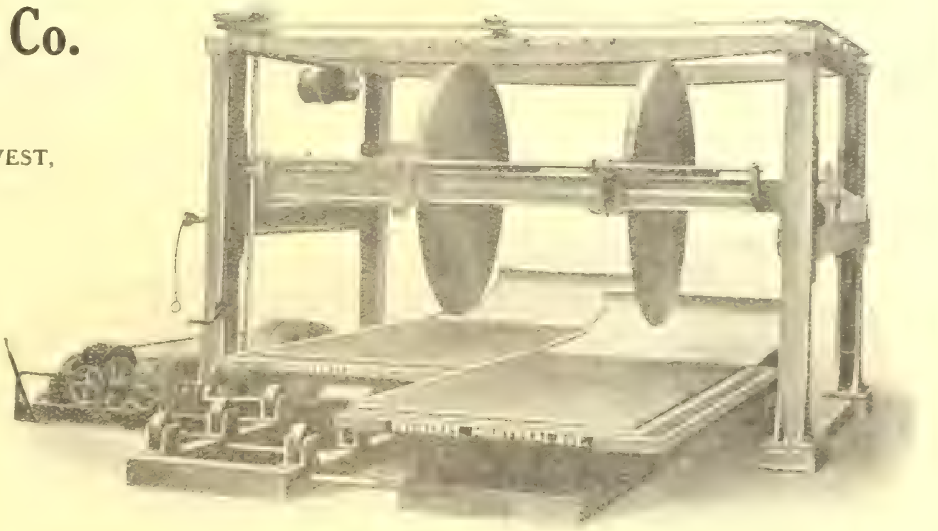

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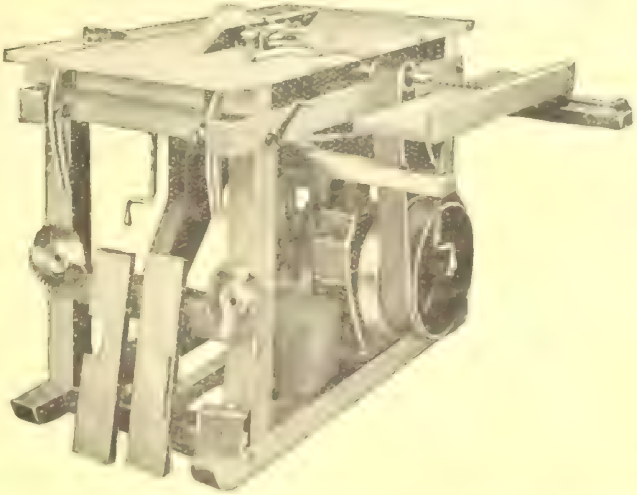

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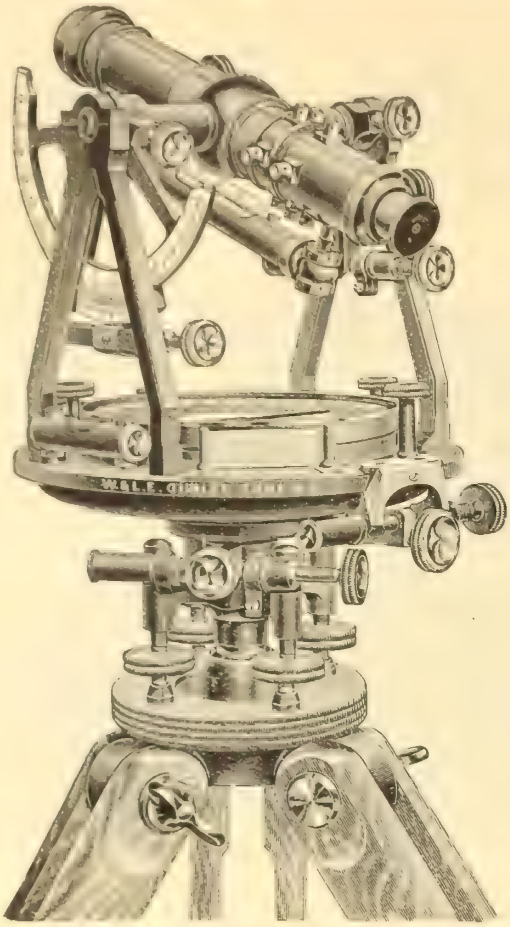

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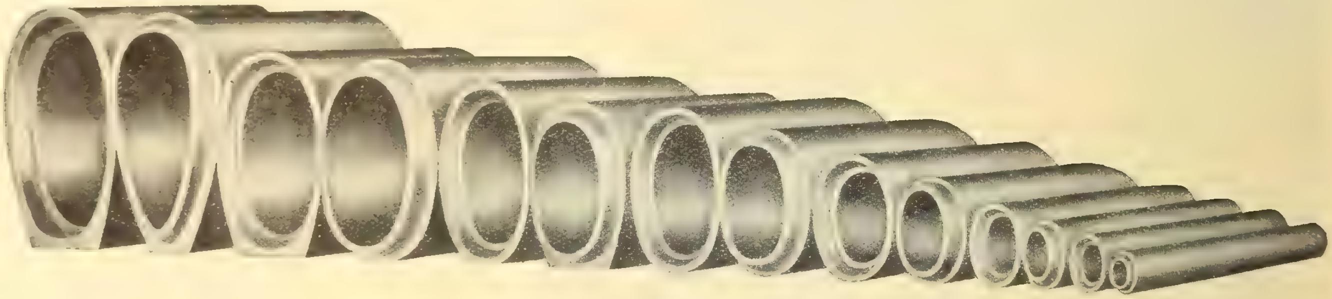

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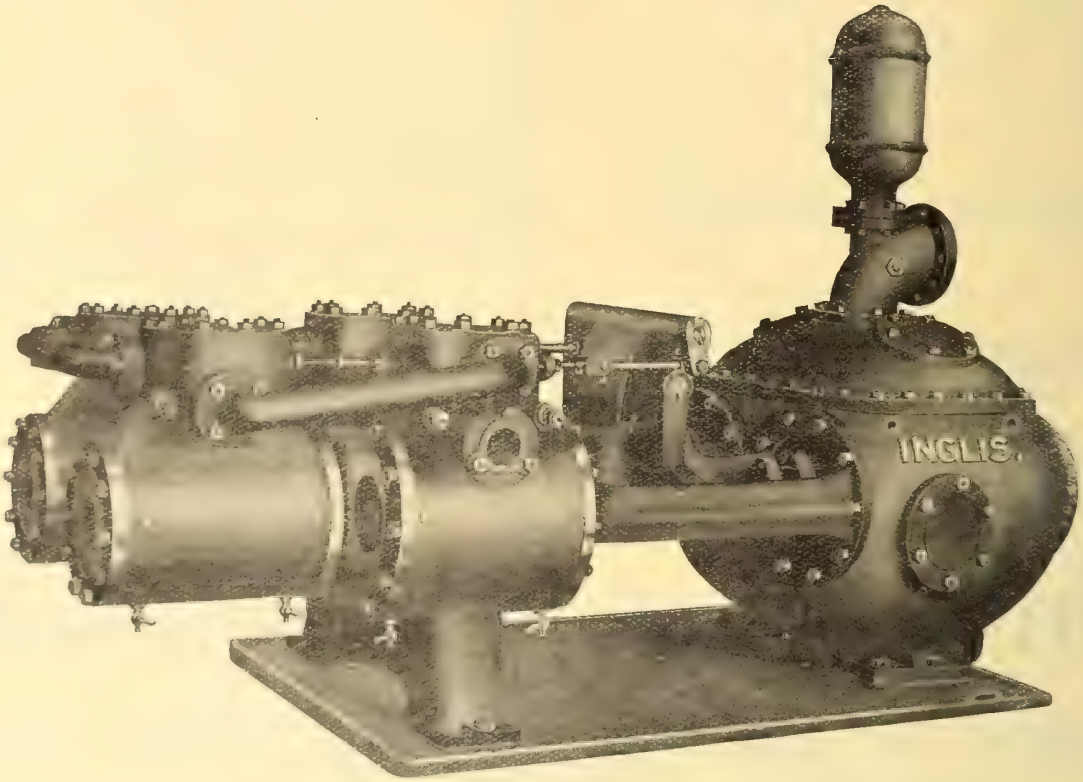

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Goderich, Ont.

The by-law providing for the expenditure of $16,000 on an extension of the town's sewer system was carried.

Lethbridge, Alta.

We are informed that preliminary lines and estimates of cost have been made in regard to the proposed gravity water line from Belly river, length, 43 miles. Estimated cost, $880,000. C. M. Arnold, city engineer.

Moncton, N.B.

The report of Engineer Chipman endorses that of Engineer Edington submitted eight years ago, and favors the McNutt brook as a source of water supply, with a recommendation that a reservoir be constructed about 3½ miles from Moncton. Estimated expenditure about $230,000. The water and light committee will secure legislative authority for the issuing of bonds for that amount.

Montreal, Que.

A by-law is being drafted for presentation to the Council this week for the loan of $2,000,000 for the city's new filtration plant. As soon as it is passed the Council will call for plans and specifications. Messrs. Hering and Fuller of New York have submitted a tender for getting out the plans.

The City Surveyor in his reports recommends that all the streets running north and south should be asphalted, new pavements laid on Sherbrooke street and St. Antoine street. It is the intention, we understand, to ask for tenders for public works in January instead of May or June.

Ottawa, Ont.

Works to cost the city in the neighborhood of $750,000 will be undertaken this year by the Ottawa municipal engineering department. The chief work will be the western drainage system, which will cost $[illegible]00,000. Then there will be the drainage of the Dow's lake district, which will cost considerably over $100,000.

Pembroke, Ont.

Pembroke has adopted a by-law for the raising by debenture of the sum of $65,000 to extend the intake pipe of the waterworks system.

Simcoe, Ont.

Willis Chipman, C.E., of Toronto, is preparing plans for the proposed sewage disposal plant to cost $50,000 to $60,000. Work will likely be done in 1911. W. C. McCall, town clerk.

St. Catharines, Ont.

A. Milne, C.E., St. Catharines, Ont., is in charge of the waterworks extension lately authorized by the ratepayers. 24,0000 feet of 24 inch, 30 inch and 36 inch pipe will be required; pipe, specials and valves, the materials. Tenders had not been called under date of last information.

Toronto, Ont.

Tenders are being called by the Board of Control until February 7th for main drainage of which description will be found in the official tender in "Tenders and For Sale Department" of this issue. G. R. Geary, chairman.

Winnipeg, Man.

The city engineer was instructed to prepare specifications for pumps for two new wells which the city will sink in a short time.

Tenders are being called until February 6th for manufacture, etc., of two pumping plants, etc. For further information see "Tenders and For Sale Department," of this issue.

Tenders addressed to chairman, Board of Control, will be received until January 13th, for construction of water mains on William avenue, Lorette avenue, and on Helen street. M. Peterson, secretary.

AWARDED.

Toronto, Ont.

The contract for the construction and erection of the 15-ton and 10-ton overhead traveling cranes for the main and high level pumping stations has been awarded to John T. Hepburn, crane builder, Toronto.

Railroads, Bridges and Wharves

Belleville, Ont.

The Dominion Railway Commissioners have passed an order in regard to the requirements of construction of C.N.R. bridge across River Moira that five piers be used. Dredging of the rocky shoal at the point where the bridge is to be constructed has been recommended by Public Works engineer. Noted previously

Fredericton, N.B.

Tenders for [illegible] wharf will be received until January 16th at the Department of Public Works.

London, Ont.

The plebiscite on question of guaranteeing the bonds of North Midland Railway was carried. That for construction of bridge over the Thames was defeated.

Ottawa, Ont.

J. D. MacArthur has been in the city investigating his chances for securing the contract for the construction of the Hudson Bay Railway. He is said to have intimated that in case he is unable to get at least a slice of this contract, he will proceed to sell out the expensive plant acquired in the construction of the National Transcontinental.

A [illegible] has been reached between the G.T.R. and C.P.R., by [illegible] along C.P.R. property under the Welling[illegible] between the two companies, thus avoiding the closing up of J. R. Booth's mills, which [illegible] logs, etc., going to the mills passed over the tracks of the G.T.R. These formerly crossed Wellington street on the level. The tracks were ordered removed and the G.T.R. to pass under the viaduct.

Regina, Sask.

The Railway Commission has approved the city's plans for the Broad street subway was the news received here. The plans provide for a subway under 16 tracks, the whole to cost $280,000. The civic estimates for the year fyled at the council meeting last night provide for an expenditure of $40,000 next year, and it is possible that more than that amount will be spent if the work progresses favorably. See "Miscellaneous" for further estimates.

St. John, N.B.

Wm. Murdoch is authority for the statement that there is talk of constructing a new bridge, but nothing definite yet.

AWARDED.

Toronto, Ont.

Contract has been awarded to Messrs. T. R. Hinds and D. A. Deeks, by the Toronto Construction Company for the remaining 38 miles to Bethany, on the C.P.R. line from Victoria Harbor to tidewater at Montreal.

Public Buildings, Churches Schools, etc.

Bracebridge, Ont.

Queen's Hotel was destroyed by fire on the 31st inst. Estimated loss about $15,000.

Brantford, Ont.

The vote on the question of a post office site is taken to mean that the government should secure its own site. The government had promised a $150,000 post office if the city would provide a site.

Architect Green, of Buffalo, N.Y., has been in consultation with the Hospital Board and Ladies' Auxiliary in regard to [illegible] hospital improvements.

Calgary, Alta.

The permit for the Mount Royal (Calgary) College was granted. The specifications call for a $45,000 building.

Cardston, Alta.

The Board of Trade are interested in the establishment of a hospital. E. N. [illegible] a site.

Guelph, Ont.

The Homewood Sanitarium here was destroyed by fire on the 6th inst. Loss about $75,000. Dr. Hobbs is interested.

The campaign for raising $50,000 for Y.M.C.A. building fund has been launched. It is stated that the site has been selected on Quebec street opposite the Carnegie library.

Granby, Que.

[illegible] by fire on the 5th inst. Estimated loss [illegible]

London, Ont.

The by-law for a new City Hall was carried.

Lunenburg, N. S.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until January 18th for electric light fixtures for Public Building here. Plans, etc., on application to the [illegible] district engineer, Halifax, and at the above department.

Montreal, Que.

Sir Lomer Gouin received a deputation recently from the Council of the Bar, asking for alterations and additions to the Court House Library. It is suggested that a gallery be constructed round the library to accommodate additional books. The Premier approved of the plans submitted and promised to submit them to the Department of Public Works.

Details have now been settled for the opening of a Juvenile Court in Montreal. A Detention Home is to be procured before the opening of the court. It is understood that this will be a temporary arrangement and that after a year's experience a special building will be erected.

It is stated that the Montreal Musical Society, represented by Lieut.-Col. Meighen and Mr. Harry Higgins, president Hotel Ritz Company, have been conferring together regarding the erection of a modern opera house.

Mount Forest, Ont.

Tenders addressed to R. C. Desrochers, secretary Department of Public Works, will be received until January 30th for construction of public building here. Plans, etc., on application to local postmaster and at the offices of Thos. Hastings, clerk of works, postal station F, Yonge street, Toronto, and at the above Department.

Odessa, Ont.

The Methodist Church here was destroyed by fire on January 6th. Loss $20,000.

Ottawa, Ont.

The plans for the new departmental building to be built by the Dominion government in Mackenzie avenue are nearing completion and it is expected that tenders will be called for in a few weeks. D. Ewart ,architect.

Tenders addressed to D. T. Elderkin, secretary, Eastern Ontario Live Stock and Poultry Show were called until January 9th for several trades in connection with the Howick Pavilion alterations.

Pembroke, Ont.

The People's Theatre was destroyed by fire on the 4th inst. Estimated loss on building, $10,000. James Stewart owner.

Port Arthur, Ont.

N. G. Neill, Industrial Commissioner, informs us that the ratepayers authorized the expenditure of $12,000 for additions to present City Hall.

Rainy River, Ont.

The money by-law for completing the fire hall and purchase of new hose were carried.

Saskatoon, Sask.

Plans were accepted for the erection of Emmanuel Divinity College, and instructions given to the architects, Brown & Vallance, Montreal, to call for tenders.

Sherbrooke, Que.

The ruling of the court holds that the school building in the Township of Westbury is unfit for occupation and that a new school should be erected in that district.

St. Thomas, Ont.

W. R. Darrach, St. Thomas, is the architect in charge of the alterations proposed for Alma College. Further particulars not ready for publication at present.

Toronto, Ont.

The first draft of plans are prepared for the new Students' Club Building in connection with the University of Toronto. Estimated cost about $300,000.

Vancouver, B.C.

The exact location of the University of British Columbia has been selected by the provincial government. The site chosen consists of 175 acres almost on the crown of Point Grey and overlooking the sea on three sides. A plan showing the land selected is being prepared by the surveyor-general.

Victoria, B.C.

The report of the fire wardens for the purchase of two sites for fire halls was adopted.

Winnipeg, Man.

The Board of Control invites the architects resident in this city and registered in the Province of Manitoba, etc., to submit designs for a contagious hospital. Particulars to be had from M. Peterson, secretary, Board of Control. Applications must be in by January 25th.

Samuel Hooper, provincial architect, is preparing plans for new government buildings to cost over $5,000,000, according to estimates. These buildings include new legislative buildings, a new agricultural college and a new asylum at Brandon to replace that destroyed by fire about a month ago.

AWARDED.

Chatham, N.B.

The contract for erection of Salvation Army headquarters has been awarded to John McDonald & Co.

Vancouver, B.C.

The contract for erection of new isolation hospital was awarded under modificacation of original plans, to Wm. O'Dell, $49,986. The lowest tender on first plans was about the same, but included heating. Other tenders were U. G. Patterson, $56,465 C. F. Perry, $63,000. Heating, Murray Bros, $3,200. The contract time has been extended from five to six months.

Winnipeg, Man.

Dunn Bros.,. of Winnipeg, were awarded the contract for the steel work on the police sub-stations, at $7,'01.

Residences

Montreal, Que.

Building permit was issued to W. H. Creed for construction of apartment house on Cote des Neiges road, $90,000

Ottawa, Ont.

Thomas Deane has purchased five lots on Goulbourne avenue on which he will erect residences.

Nimmo and Soper will build five or six fine residences in the spring, to cost around $6,000 each.

Toronto, Ont.

A permit has been issued to Mr. T. P. Stewart for apartment house, Oriole road, $30,000.

Business Buildings and Industrial Plants

Belleville, Ont.

The factory now operated by Mr. Deacon was destroyed by fire on January 7th. Estimated loss on building, $15,000.

Calgary, Alta.

The C.P.R., it is stated, have put in their estimates for the next year a request for an appropriation to complete the west wing of the station.

Chatham, Ont.

Under date of last information the contracts for construction of plant for Western Bridge & Equipment Co. had not been awarded. The building will be of steel frame and fireproof; size, ground floor, 82 x 196. Estimated cost of building, $10,000; of equipment, $10,000. Engineer, A. W. Connor, Toronto street, Toronto.

Edmonton, Alta.

Fire destroyed the two storey frame building on First street occupied by the A Carruthers Fur Co., on the 31st ult. Loss estimated at $5,000.

Fort Frances, Ont.

Work has commenced on the new mills for the Shevlin-Clark Company, and it is expected they will be finished by June 1.

Gilbert Plains, Man.

The large brick store owner by Fred Davis has been recently destroyed by fire. Loss about $7,000.

Iberville, Que.

We understand that the Norcross Bros. Co., contractors and importers, whose premises were destroyed by fire on December 26th last, will commence rebuilding almost immediately.

Islington, Ont.

The by-law granting site to a carpet factory was carried.

Lacombe, Alta.

The Victoria Hotel, Kasha & Curtice's implement warehouse, and other buildings were destroyed by fire on the 3rd inst. Estimated loss, about $75,000.

Lake Megantic, Que.

The largest business block here was destroyed by fire on the 4th inst. Loss, about $30,000.

London, Ont.

The McClary Manufacturing Company has taken option on about 24 acres of land between Trafalgar street and the Thames river as the site for further extensions. Other additions are under consideration.

Montreal, Que.

Tenders are being invited by Messrs. Peden & McLaren, architects, Montreal, for some alterations in the Bank of Montreal, consisting of construction and moving of certain offices, and alterations in connection with the teller's cages.

Mr. H. Higgins, president of the Ritz Hotel Company, has announced that arrangements for erection of the hotel to be built on Sherbrooke street have been concluded. Mr. Wetmore, architect; Mr. Maxwell, Montreal, associate architect.

The Canada Rubber Company have taken out a permit to erect a factory costing $250,000 on Monarch street.

Mr. Wilder has purchased another large block of land on Bleury street, Montreal, and intends erecting a ten-storey building there as soon as plans can be completed.

New Westminster, B.C.
Galbraith & Sons will erect a large sawmill and factory on Lulu Island, and have applied to the city for a 25-year lease. The mill will be three storeys, 40 x 225 x 60 feet. It may be necessary to submit the proposition to the ratepayers.

North Hatley, Que.
Messrs. Reed, McRae, McNerny and Robinson, all of this place, and a recently formed company, will erect a large sash and door mill and will operate the same. Construction will begin at once. Cost about $25,000.

Owen Sound, Ont.
The Bell Telephone Company will erect a new exchange on Ninth street east, two storeys in height, with basement of concrete construction. Cost of plant and equipment, about $23,000. Total cost, including site and underground conduits, about $50,000.

Penticton, B.C.
A proposition is being entertained by local capitalists and others to build a large tourist hotel here at a cost of about $100,000.

Quebec, Que.
Press reports state that tenders for demolition of the old Champlain Market will be called this week. When this is finished tenders for construction of Transcontinental Depot will be called. Estimated cost, $500,000. Noted previously.

Mr. Arthur E. Scott, honorary treasurer of the Quebec Board of Trade, has purchased the property forming the southeast corner of Mountain Hill and Notre Dame street, Lower Town. Mr. Scott, we understand, intends increasing the height of the building and fitting the same up as a modern office building.

Price Brothers contemplate the erection of new pulp and paper mills at Riviere du Sable with the opening of spring. About 14,000 h.p. will be developed and a village established to accommodate in the neighborhood of 4,000 people.

St. Catharines, Ont.
Messrs. Howard and Cluff, representing the Steel & Radiation Co., Ltd., have signed an agreement with the city council to erect a new factory on a site near the new Welland Canal, next to Jenckes' machine factory.

St. John's, Que.
S. M. Green, Springfield, Mass., is the architect in charge of the erection of factory and power plant for the Cluett Peabody Company, headquarters, Troy, N.Y. Sizze, 200 x 86; number of floors, five. H. G. Clark, engineer in charge. Information sent under recent date did not state whether contracts were awarded. Noted in issue of December 14.

Sydney, N.S.
The following building permits have been issued: To F. L. Dixon for the erection of a shed for brick storage for the Dominion Steel Corporation, $4,000; to S. H. Stevenson for the reconstruction of the Alfonso Hotel, $3,000.

Toronto, Ont.
Permit was issued to C. P. R. for 2-storey brick station, West Toronto, $20,000.

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Three Rivers, Que.
Application has been made to the town by Messrs. Greenshields, Jaques, Bureau and Craig, for exemption of taxes for 20 years and eight-inch water mains on the streets surrounding the proposed property of the St. Maurice Valley Cotton Company, who propose to erect a million dollar building devoted to cotton spinning.

Plans are being prepared by Mr. T. Pringle, of Montreal, for the erection of a 100-ton pulp and paper mill here for the Wayagamite Company. Mr. C. R. Whitehead is in charge of affairs at Three Rivers. Work will be commenced in the spring.

Vancouver, B.C.
The Eastern Townships Bank, is stated to have purchased a site here suitable for the erection of a branch bank. Mr. J. McKinnon, general manager, head office, Sherbrooke, Que.

Newspapers reports state that Mr. C. H. Lilly, president of the C. H. Lilly Company of Seattle, wholesale miller, grain and seed dealers, will establish a branch here and possibly erect in the near future a milling plant.

Plans were presented for large warehouse, corner of Homer and Drake streets, to be built for W. D. Morison, $65,000. Contracts have been let.

Victoria, B.C.
Tenders were invited for a brick office building on Broad street until January 10 for P. R. Brown. H. S. Griffith, architect, 1006 Government street.

Mr. James E. Wilder has purchased lot 176 St. Lawrence Ward, with buildings, at the corner of Sherbrooke and Bleury streets, Montreal, for the sum of $50,000. He will probably erect an eight-storey building there.

Virden, Man.
The block owned by W. C. Wainwright was destroyed by fire on the 4th inst. Estimated loss about $10,000.

Welland, Ont.
The work of tearing down the buildings, preparatory to the erection of Mr. John Goodwin's new block will commence [illegible] the 15th inst.

Windsor Mills, Que.
The Chateau Windsor was burned to the ground on January 5th. Loss, $20,000.

Winnipeg, Man.
Mr. Patterson, chairman of the telephone commission, has announced that early in the spring work will be commenced on the extension of the Main Exchange building on Portage avenue east. This will take the form of an addition to the building from the ground up, and when completed will be used as the quarters of the commercial staff.

The following building permits have been issued recently: Permit for a steam turbine power station to be erected by the Winnipeg Electric Railway Company on Mill street, $72,000. The Crane-Ordway Company, Limited, will spend [illegible] for additions and alterations to the warehouse on the east side of Lombard street.

AWARDED.

Montreal, Que.
The Queen's Hotel Company will commence work on a seven-storey annex on St. James street, to cost [illegible]. [illegible] Archibald are the architects and the contract has been awarded to Mr. Peter Lyall. Work to be finished by July 1st.

The contract for the building of the two extra storeys on the extension of the Place Viger Station of the Canadian Pacific Railway has been let to Stewart & Co., and the construction work will be commenced in a few days.

Ottawa, Ont.
Taylor & Lackey have been awarded the contract for the carpentering work on the Slinn-Shouldis bakery. J. Mather, architect.

The steel for the Canada Foundry Company for the Blackburn building has arrived. An effort is to be made to have this first section of the building completed by July 1st. Holbrooke & Sutherland, general contractors.

Quebec, Que.
Simoneau & Dion, of Sherbrooke, have been awarded a $200,000 contract for an office building for the Quebec Railway, Heat & Power Company, at Quebec. The building must be completed by November 15th.

Saskatoon, Sask.
The contract for erection of King George Hotel here has been let to Carter, Halls and Aldinger of Winnipeg, $246,000. Total cost, about $400,000. The Saskatoon Investment and Trust Company are interested.

Power Plants, Electricity and Telephones

Arthur, Ont.
The by-law to take $30,000 stock in the People's Railway carried.

In West Garafraxa township the by-law to take $40,000 stock in the People's Railway was defeated by a small majority.

In Dundalk the by-law to aid the People's Railway was defeated by 84 majority.

Cornwall, Ont.
Messrs. Moloney and P. F. Campbell are reported to be considering plans for building a proposed electric railway between Hawkesbury and Cornwall.

Dundas, Ont.
The Hydro-Electric by-law was carried.

Edmundston, N.B.
The town clerk of Edmunton publishes notice of application to the legislature for authority for the town to issue bonds for $40,000 to establish an electric light and power plant, and to build and maintain a dam at the second falls at Green River for this purpose.

Lunenburg, N.S.
See Public Buildings.

Owen Sound, Ont.
See Public Buildings.

Ottawa, Ont.
An application will come up at the next meeting of the city council to give permission to the Morrisburg and Ottawa Electric Railway to come into the city along Main street, Ottawa East, connecting with the Ottawa Electric Railway there.

The White Way will be extended [illegible] It is expected that 40 ornamental poles will be [illegible] ornamental lights along Wellington street.

Tenders addressed to Chairman, Municipal Electric Department, will be received until January 12th for 150 ornamental [illegible]

continued on page [illegible]

Tenders and For Sale Department

Steam Shovels

We own and have for sale near Niagara Falls, 2 Vulcan 75-ton, 2½ yard steam shovels, late rebuilt with new extra large boilers and in excellent condition; also one 70-ton. These will stand most rigid inspection and we are offering them at unusually low prices. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

Toronto Main Drainage

Sealed Tenders addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, endorsed "Tender for Section No. 1, Low Level Interceptor,'' or "Tender for Laying Reinforced Concrete Over-flow Pipe from Sewage Tanks,'' etc., as the case may be, for the construction of the several sections of Low Level Interceptor and other works, as mentioned below, will be received by registered post only, until noon of TUESDAY, FEBRUARY 7TH, 1911.

The following is an approximate description of the various works:—

1. Low Level Interceptor, Section No 1, Egg shape, 2 ft. 10 in. x 4 ft. 3 in. 4,566 linear feet.
2. Low Level Interceptor, Section No. 2, Egg shape, 3 ft. 2 in. x 4 ft. 9 in., 2,475 linear feet.
3. Low Level Interceptor, Section No. 3, Egg shape, 3 ft. 6 in. x 5 ft. 3 in., 2,295 linear feet; Circular, 4 ft. 6 in. diameter, 1,023 linear feet. (Total length Section No. 3, 3,318 linear feet).
4. Laying reinforced concrete overflow pipe from sewage tanks, 292 linear feet of 60-inch circular pipe in lengths of about 24 feet.
5. Cast Iron Penstocks for Low Level Interceptor.

Tenderers shall submit with their tender the names of two personal sureties approved by the City Treasurer, or in lieu of said personal sureties the bond of a Guarantee Company, approved as aforesaid.

Specifications may be obtained from, and original drawings will be on file and can be seen at the Main Drainage Department, City Engineer's Office, on and after January 9th, 1911.

For the convenience of Contractors, sets of blue prints have been prepared and will be issued to contractors, upon application to the City Engineer and upon receipt of deposits as follows: For items 1, 2 and 3 combined, $5.00; for item 4, $2.00, and for item 5, $2.00. Deposits should be made by cheque payable to the City Treasurer. The deposits will be refunded upon return of blue prints in good condition within thirty days of receiving tenders.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.

City Hall, Toronto,
January 3rd, 1911. 2-4

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

Agents Wanted

Agents wanted in all parts of Canada to handle wood preserving for Poles, Cross-Arms, Railroad Ties and Construction Timber. For particulars write W. D. Ward, Tribune Building, New York. 1-2

Tenders

Sealed tenders are asked (for all and part) for Brick Church, Foldens. Tenders open till JANUARY 14TH, 1911. For plans, etc., see Wm. Pullin (chairman), or C. W. Budd (secretary), Foldens, Ont. Bell phone service 49, ring 14, Ingersoll. Lowest tender not necessarily accepted.

WM. PULLIN,
52-2 Foldens, Ont.

City of Winnipeg

Tenders for

Pumping Machinery

Sealed tenders addressed to the Chairman, Board of Control, Winnipeg, Canada, will be received at the office of the undersigned up to 11 a.m., on MONDAY, FEBRUARY 6TH, 1911, for the manufacture, delivery and erection complete of Two Pumping Plants each of a capacity of one million imperial gallons per 24 hours. Specifications and forms of tender, together with conditions governing tenders as prescribed by by-law, may be obtained at the office of the City Engineer, 223 James Avenue, Winnipeg. The city reserves the right to reject any or all tenders, or to accept any bid which appears advantageous to the city's interest.

M. PETERSON,
Secretary.

Board of Control Office,
Winnipeg, Jan. 6th, 1911. 2-3

Extension of Time

City of Regina

Tenders for Power Plant

Tenders are asked for by the City of Regina for the supply and installation of any or all of the following, together with the necessary connections ready for operation:

1 1500 k.w. Steam Turbine Generating Unit.
1 500 k.w. D.C. Generating Unit.
2 500 Horse Power Boilers.
1 Economizer.
1 Hand Power Travelling Crane.
1 Coal and Ash Conveyer.

Tenders will be received for the above until noon, TUESDAY, JANUARY 31, 1911. Specifications and all information will be furnished on application to the undersigned or to E. W. Bull, City Electrician.

(Signed) A. J. McPHERSON,
51-2 City Commissioner.

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

ALL ROUND ARCHITECTURAL DRAFTSMAN.—14 years' experience, capable of handling large projects as well as ordinary commissions, managing an office and interviewing clients. Four years' private practice. At liberty May 1st. Vancouver, Victoria or other Pacific coast cities preferred. Address LOUIS R. CHRISTIE, 2542 North Spaulding Avenue, Chicago, Ill. 2-3

Positions Vacant

Advertisements under this heading two cents a word per insertion

WANTED IMMEDIATELY.—Competent architectural draftsman. Must be first-class on design, working drawings, details, and perspectives rendered in colors, and be capable of taking charge of office in western city. State salary expected; send samples of work. Only first-class men need apply. Address Box 187 "Contract Record,'' Toronto. 2-3

An Experimental Road at Ithaca, N.Y.

An experimental road was constructed during 1909 and 1910 by the co-operation of the U. S. Office of Public Roads and the Sibley College of Civil Engineering at Cornell University. The general plan of these tests is much the same as that of the Ohio State Highway Commission at Columbus, Ohio.

The Ithaca road is described in the October number of the "Cornell Civil Engineer'' by Mr. Charles H. Hoyt, U. S. Superintendent of Public Road Construction. It is built in widths of 16 feet in 15 sections as flolows: Section 1—Coal-gas tar, penetration method, 300 feet; Section 2—Coal-gas tar, mixing method, 300 feet; Section 3—Paving brick grouted with cement, macadam foundation, 306 feet; Section 4—Semi-asphaltic oil, mixing method, 275 feet; Section 5—Refined asphaltic oil, penetration method, 300 feet; Section 6—Refined semi-asphaltic oil, penetration method, 300 feet; Section 7—Kentucky rock asphalt, 300 feet; Section 8—Refined water-gas tar, penetration method, 300 feet; Section 9—Refined semi-asphaltic oil, penetration method, 300 feet; Section 10—Open-hearth slag water-gas tar, penetration method, 100 feet; Section 11—Open-hearth slag, 200 feet; Section 12—Semi-asphaltic oil, mixing method, 260 feet; Section 13—Cinder concrete, 35 feet; Section 14—Limestone concrete asphalt paint coat, 30 feet; Section 15—Limestone concrete, 500 feet.

The work was interrupted by the coming of winter, and in the following spring a legal question, involving the right of way, delayed the work until this last fall, when it was again resumed. It is, therefore, too early to draw any conclusions as to the respective wearing properties of the various materials. It would appear, from descriptions on the two experiments, that the Ithaca road does not have nearly as much traffic as the Columbus one.

Nap. Leblanc, lumber merchant, St. Pierre de Wakefield Que., is stated to have sold assets.

Miramichi Pulp & Paper Company, Limited, manufacturers of pulp, are stated to be in liquidation.

The manse and building board of the Presbyterian Church has authorized loans for the building of churches at Dayton, Alta., Netherhale, Sask., Bowell, Alta., Grassy Lake, Alta., and Kinsela, Sask. Manses will be erected at Woldon, Moss Lake, and Eyebrow in Saskatchewan; at Creston, C.B., and at Whitewater. Permission has been granted to the congregation at Ochre to float a loan for the purpose of erecting a church building and manse.

Power Plants, Electricity and Telephones

(Continued from page 29)

inch globes and 600 McBeth Evans alba 12-inch globes. J. E. Brown, electrical superintendent.

Application for a charter will be made by the Imperial Traction Company to build proposed railways, telegraph and telephone lines to connect Hamilton, Guelph, Stratford, St. Marys, London, Ingersoll, Woodstock and Brantford, and back to Hamilton, with branches to Niagara Falls and to Sarnia. It is reported that construction will begin in the spring on proposed network of lines. Headquarters, Hamilton; capital, $6,000,000; directors: L. B. Howland, of Toronto; Roger Millar, of Ingersoll; Geo. M. Reid, of London, and S. W. Hay, of Listowel.

Penticton, B.C.

The by-law to raise $71,000 for the installation of electric light service was carried.

Prescott, Ont. .. . ..

The Aluminium Company of America have purchased 3,500 acres of land, including Barnhart's Island, in St. Lawrence river. They propose, it is stated, installing a plant capable of developing 300,000 h.p.

Port Arthur, Ont.

We are informed that the ratepayers authorized the expenditure of $15,000 for improvement to street lighting. N. G. Neill, industrial commissioner.

Regina, Sask. 4

Tenders addressed to S. P. Porter, deputy Minister of Railways, will be received until January 14th for supply of telephone poles. Particulars obtained on application to the above.

Bids will be received January 17th by A. J. McPherson, City Commissioner, for furnishing and installing the followings:—A 1,500 k.w. steam turbine generating unit. A 1,100 k.w. steam turbine generating unit; 500 k.w. d.c. generating unit; 500 h p. boiler, economizer; hand-power travelling crane, and a coal and ash conveyor. E W. Bull, City Electrician.

Strathroy, Ont.

The by-law to raise $6,000 for improvements to the electric light and waterworks systems carried.

Thorold, Ont.

Local improvement and two power by-laws were carried.

Winnipeg, Man.

See Public Buildings.

The sum of $80,000 was recommended for the construction of power conduits on the main city thoroughfares, viz.: On Main street from Higgins avenue to Graham street, on Portage avenue from Main to Carlton; on Notre Dame from Portage to King, and on McDermot avenue from Main to King.

AWARDED.

Regina, Sask.

The City Council decided to place an order with the Ottawa Car Company for four single and two double-truck cars for the new municipal street railway, under construction. Delivery July 5th, 1911.

Sherbrooke, Que.

The contract for development of the Drop Off power here has been awarded to Messrs. Morrow & Beattie, Peterborough, Ont., $51,220, providing it is satisfactory to the Board of Control, City Attorney and Engineer. Ross & Holgate, Montreal, will supervise the construction of plant until complete. The above contract does not include the hydraulic and electrical machinery. Work will be commenced at once, it is stated. Total cost of development, $100,000.

Victoria, B.C.

The tender of Messrs. Hawkins & Hayward for the supply of the following number of articles, at the following prices, was recommended for acceptance by Electric Light Committee 250 lamps at $127 per hundred; one gross of 14-in. globes at $270; two gross of 12-in. globes at $162.

Winnipeg, Man.

The board of control has recommended for acceptance the tender of Siemans Bros. Dynamo Works, Toronto, for supply of motor generators, $16,410.

Miscellaneous

Montreal, Que.

Tenders are to be invited by the Richilieu & Ontario Navigation Company for two large ferries for the Bourcherville & Longueil services from Montreal.

City Attorney Ethier has completed a draft of contemplated by-laws showing what loans the city may float during the current year, as follows Four and a half millions for various public works. Five millions in order to construct underground conduits. One and a half millions to instal a filtration plant. One million to be used as a working capital. Two millions to be borrowed in order to instal an electric municipal lighting plant. These await approval of Council.

Ottawa, Ont.

Tenders addressed to the Secretary of the Militia Council will be received until January 20th for supply of target frames.

The permits taken out recently include: W. A. Gardner, dwelling, Heney street, $3,500; J. W. Featherston, dwelling, Bay street, $3,000; Gordon Rogers and E. R. McNeill, oce building, Queen street, Geo. Tomlinson, builder, solid brick construction, $10,000; W. Hunt, shop and dwelling, Division street, $3,000; Ottawa Electric Railway, addition and power house, Middle street, $7,000; O. K. McDonald, dwelling, Arlington avenue, $3,000; William Coats, dwelling, Clarey avenue, $3,600.

Port Arthur, Ont.

We are informed that the ratepayers have authorized the expenditure of $20,000 for fire alarm system. N. G. Neill, industrial commissioner.

Regina, Sask.

The City Commissioner recommends that the following programme of work be completed this year pending the confirmation of the new assessment roll:—Extension to power plant, $100,000; fire hall equipment, $7,185; sewer and water extensions, $20,000; increase of water works supply, $10,000; city's share of pavements, [illegible]; trunk sewer and disposal works, $51,800; Broad street subway, [illegible]. After the confirmation of the assesment roll he recommends that the following work be done: Trunk sewer, [illegible] east to [illegible] street, [illegible]; completion of disposal works, $51,7[illegible]; Wascana Valley trunk sewer, $90,000; total, $166,700. Sewer and Waterworks Extensions (including damage claims), $45,000; increase of water supply —possibly, $100,000; city's share of pavements, $30,000; Broad street subway, $85,000.

Toronto, Ont.

Recent building permits include: W. Burton, 3 attached 2-sty. brick dwellings, on Symington, $6,000; McCausland & Black, 3 att. 2-sty. brick dwellings, 24, 26 and 28 Shirley, $6,000; J. M. Lowes Company, 3-sty. brick warehouse, 92 Sherbourne street, $16,000; E. B. Smith Estate, alterations to store, 54 Yonge, $4,500; M. Rawlinson, 3-sty. brick stable, on St. Nicholas, $19,000; Mrs. W. H. Barker, pair semi-detached 2-sty. brick dwellings, 456-8 Margueretta, $4,000; S. J. Gee, 3 pair semi-detaached 2-sty. brick dwellings, Palmerston Gardens, $12,000; F. B. Allan, 2-sty. brick factory, on Logan, $7,000; Toronto Feed & Produce Company, 2-sty. brick warehouse, on 106 Vine street, $8,000; J. J. Farrell, 2 detached 2½-sty. brick dwellings, 161-3 Campbell avenue, $4,600; T. P. Stewart, 2-sty. brick apartments, on east side Oriole, $30,000; A. W. Pike, 3 detached 2-sty. brick dwellings, on south side of Dewson, $7,500.

Victoria, B.C.

The tenders received for motor apparatus for fire purposes were recommended as follows: One Seagrave combination hose and chemical wagon, as per specifications, for the sum of $6,725. One Seagrave hose wagon, as per specifications, $6,334. Both of these machines are motor propelled.

Vancouver, B.C.

Permits were granted recently as follows: Dr. McAlpine, Point Grey road, $25,000; C. E. Strong, 1552 Twelfth avenue east, three houses, $6,000; Baker & Hay, 12 0 Hamilton street, warehouse, $16,000; R Brant, 556 Eighth avenue east, $3,000; Findlay & Anderson, 1456 Eighth avenue east, $3,000; L. Elliott, 1350 Walnut street, $3,500; William Mitchell, 1222 Twelfth avenue east, $2,550.

The following tenders for the new hospital boat were received and referred to the chairman and medical health officer: Hoffar Motor Boat Company, Campbell engine, $4,786; Page Gasoline Engine and Supply Company, Campbell engine, $4,786; N. G. Ross, boat to be remodelled, $4,900.

New Companies

International Contracting Company, Limited, Winnipeg, Man., incorporated, capital, $50,000,000. Incorporators, R. Lush Miller and E. W. Peters, financial brokers, S H. Green and E. R. Chapman, barristers, all of Winnipeg. Besides contracting, lumbering, manufacturing, oil refining and shipbuilding, the company is empowered to acquire the carbon oil works.

Reynolds Company, Limited Montreal, Que., capital, $20,000. Incorporators, Percy C. Ryan advocate; Romeo Houle real estate agent, [illegible] H. [illegible] and [illegible] T. Stackhouse, advocates, and [illegible] [illegible], manager, all of Montreal. [illegible] company to engage in [illegible], etc.

Mahoney Building Company, Limited, incorporated, Guelph, Ont., capital, $80,000. Incorporators, J. J. Mahoney, plasterer, W. A. Mahoney, architect, and H. Mahoney, plumber, all of Guelph.

The Insurance Brokerage & Contracting Company, Limited, incorporated, Toronto, Ont., capital, $50,000. Incorporators, M. F. Van der Voort, barrister, and J. Lees Galloway, accountant, both of Toronto.

Tests of Reinforced Concrete Columns

By H. Burchartz, Gross Lichterfelde.

A series of tests have been made in the Royal Testing Laboratory [illegible] reinforced concrete columns in order to determine the influence on the strength of the reinforcement in general and especially of the kind of cross-reinforcement (bands and hoops). Professor Rudeloff has recently reported on the results of these tests in the fifth volume of the publications of the German committee on reinforced concrete.

In the following paragraphs is given a brief summary of the results of the tests.

The tests were made in two series. In the first series 13 columns of 2-m (78 inches) length were tested. Eleven columns had a 30-cm (12-inch) square section and two columns an octagonal section. The longitudinal reinforcement consisted in all cases of four round steel bars of 16-mm (⅝-inch) diameter. The cross-reinforcement was of various types, made with wire 7 mm. (about ¼-inch) thick. The concrete was gauged with a large percentage of water so as to obtain a soft consistency.

The tests demonstrated the well-known fact that the influence of the reinforcement is much less than that due to the care in tamping. Besides this fact the surprising result was found that all columns when tested broke at the end last tamped whether this end was placed in the top or bottom of the testing machine.

Some specimens gave very anomalous results and these deviations appear to have been caused partly by the columns being made in the open air, partly in moist and partly in dry weather.

On account of this result of series 1 it was found necessary to undertake further tests, series 2. The columns for this series were made in a closed room kept as uniformly warm and moist as possible. Their length was only 90 cm (about 35 inches). Of the seven kinds of columns tested five had square sections with four 16-mm (⅝-inch) round longitudinal bars each; two had octagonal sections with eight 8-mm (5-16-inch) or 11-mm (7-16-inch) longitudinal bars each. The cross-reinforcement of spiral steel bars and partly of rings made with 6-mm (¼-inch) rods; whereas the square columns were reinforced with various kinds of bands of 7-mm. wire.

The results of the second series show a greater uniformity than those of the first one. For instance, the columns without reinforcement showed by far the greatest increase in cross-section and the least resistance. The two octagonal columns reinforced with steel rings carried the largest loads up to the beginning of the formation of cracks and up to fracture.

As in the first series it was observed in the second with nearly all columns that failure began at the end last tamped. In order to learn the reason for failure at this point another column was tamped and immediately after tamping samples of the concrete were taken from various parts of the column and examined for content of water, content of cement and weight per volume. This examination showed that the content of water and also of cement increased from the bottom to the top, although to a slight extent only, but that the weight per volume was without doubt greatest at the bottom and less at the top of the column. The top, which naturally was subjected to less tamping and was consequently less dense than the other parts of the columns, showed the least resistance.

Cost of a "Rattler" Brick Testing Outfit

For several years past the vitrified blocks used by the city engineer's department of Baltimore, Md., have been tested for quality in the Highways Division of the Maryland Geological Survey. Last year, however, the city decided to install a rattler at the city yard for the department's use. The rattler is the standard National Brick Manufacturers' Association machine, 28 inches in diameter, 20 inches long within heads. The barrel is a regular polygon of 14 sides and contains about 12,018 cubic inches. It was manufactured by Olsen Bros., Philadelphia, Pa. The machine is driven by a 5 h.p. Westinghouse Type A, single phase electric motor, making 1,710 revolutions per minute. The speed was geared down at the rattler end of the belt to produce 30 revolutions per minute. The speed in operation runs from 1,799 to 1,801 revolutions per hour and is very satisfactory in that respect. The first test of vitrified block with the outfit was made August 31st, 1909. The cost of the outfit and the expenditures during the year ending December 31st, 1909, were:

One vitrified block rattler with belt	$192.50
One 5 h.p. motor	150.00
Cast steel shot	12.00
Freight and drayage	10.20
Building foundations and remodelling shed	53.32
One set scales	8.70
New cast-iron shot	10.20
One new pulley	5.20
One revolution counter	4.00
Electric installation	37.64
Electric Co.'s electric connection	3.73
Electric current	5.69
Total	$493.18

Strengthening Old Wrought-Iron Trestle with Concrete

A most important use of concrete in engineering structures is the method which has been adopted for the strengthening of the old wrought-iron trestle approaches to the Danville, Illinois, railroad bridge, and the St. Charles bridge. These structures, which were built many years ago, were constructed of Phoenix columns, with diagonal tie rods. With the great increase, says the "Scientific American," that has come of late years in the weight of trains, it has become necessary either to strengthen these trestles or remove them altogether. The former course was followed; and the method adopted was to incase the columns in concrete. Tests of the strength of these reinforced compression members show that the addition of the concrete has raised their strength fully 50 per cent.

A vibrator for compacting concrete roadways instead of the usual tamping methods was employed in building the Munger Boulevard at Dallas, Tex., by Mr. R. C. Stubbs, of that city, who has secured a patent for his device. The subgrade, according to "Good Roads," was prepared in the usual manner and finished with its surface 5 inches below the grade established for the pavement surface. A 1:3:6 concrete, mixed in an Austin cube mixer, was then spread to the full depth of 5 inches and struck to the proper grade. A coating of medium sized broken stone was then placed upon the surface and boards or platforms laid over the pavement. Upon these the vibrator was operated, the planking being moved forward when one section had been consolidated. The vibrator consists of a motor-driven mechanism mounted upon a hand truck, through which the vibrations set up are transmitted to the planking and thence to the concrete below. The operation serves not only to consolidate the concrete itself, but also to embed the stones in the upper portion of the concrete. The machine has a rated capacity of 1,000 square yards of pavement per nine-hour day. The advantages of this method of consolidating concrete pavements, as set forth by its inventor, are that a greater density and more even texture in the concrete are obtained than is possible by ordinary tamping. The rapid succession of comparatively light blows delivered by the vibrator, in conjunction with the weight of the apparatus, are more effective, it is claimed, than tamping, since the air and water are driven out and the resulting mixture is practically without voids. Another advantage is said to be that all parts of the pavement may be made equally dense; the combination depending upon a mechanical process capable of exact regulation.

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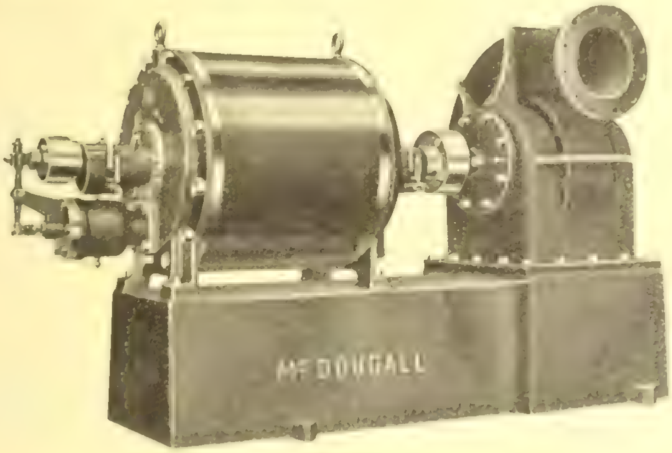

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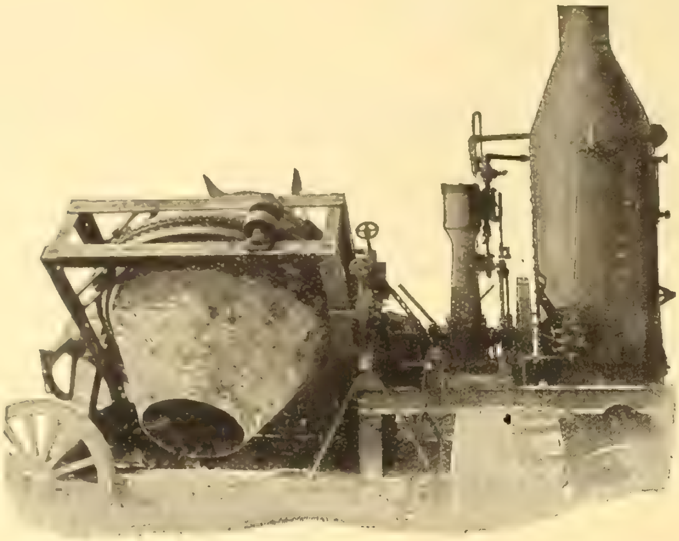

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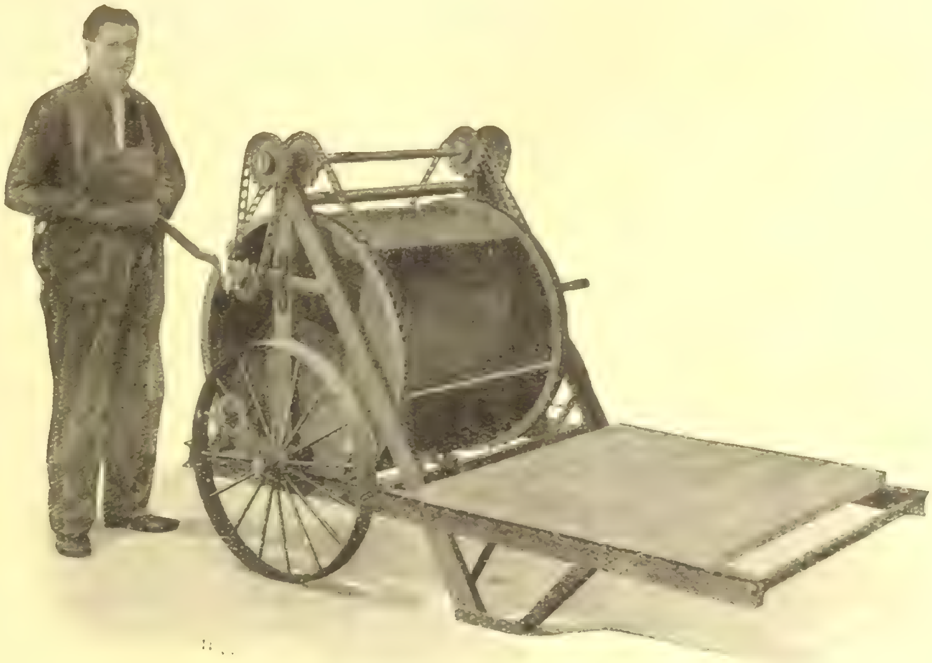

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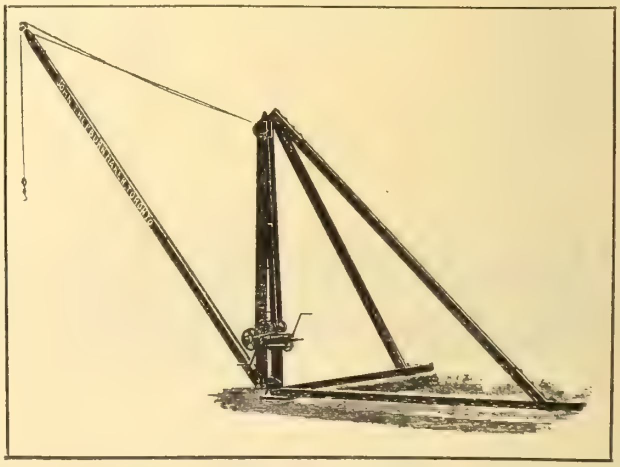

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New Offices of the Contract Record

For the past eighteen years the Toronto offices of the "Contract Record" have been located in the Confederation Life Building. From time to time additional accommodation was secured to meet the growth of the business. This being no longer possible, we have now removed to the new building illustrated above at 220 King street west, where a most cordial welcome will be extended to our friends and everyone interest in engineering and contracting. May the reader consider this a personal invitation to visit us in our new home.

New Headquarters of the Contract Record
at 220 King Street West, Toronto

With the greater facilities and better equipment of our new building, coupled with an efficient organization, the "Contract Record" will not only maintain its present strong position, but will forge ahead to a much higher standard of efficiency and usefulness. Watch its development during 1911!

Conditions in Transcontinental Railroad Camps

Last September, the Norwegian consul at Montreal, Mr. Jacobson, sent his countrymen a warning against coming to Canada to engage in railroad construction, stating that the contractors in this country were both inhuman and unfair.

According to official statistics, some 35,000 men are employed on Canadian railroad construction, and with the rapid developments of the field and the ever-growing demand for labor, it is most desirable in the interests of the country at large and the contractors in particular that statements like those made by Mr. Jacobson should be discussed fairly.

The matter is recalled by a letter written by one, Gubrandsen, published in the Montreal Star of recent date. Mr. Gubranden, having worked for seven years on the railroads of eastern Canada, both on construction and as a sub-contractor, has some claim to authority. His complaints, in the present case, are laid exclusively against the N.T.R. Much of this construction, he says, is carried on in the wilderness and the labor conditions should be supervised by the government. Not only are the sanitary conditions of living bad, but the camps themselves are badly constructed and unhealthy, besides being inadequately protected against damp and cold. In addition to this, they are congested and stuffy, and altogether make excellent breeding places for innumerable diseases.

As for the system of medical inspection, according to this writer it is often a farce. In cases of emergency instruments and appliances are seldom available. At one camp where Gubrandsen remained for nine months the only medical appliance kept at the contractor's office was a case containing one roll of absorbent cotton —no carbolic acid or salve of any kind.

A particular grievance is that connected with the system of payment. It is claimed that laborers have to sacrifice ten cents on the dollar in order to cash the orders and cheques for their wages.

All kinds of advantage, it would appear, are taken by the contractor over those who take subcontracts for sections of the track. The contractor supplies the stores, food and equipment and charges pretty much as he likes for them. In this connection Mr. Gubrandsen writes:

"In order to show what the contractors usually pay the subcontractors for the work in the eastern part of the National Transcontinental Railway, I give the following prices:

"Mining of rock is paid at the rate of from [illegible] up to $1 per cubic yard. The contractor generally receives [illegible] or more.

"As regards prices of supplies, there is an item for two horses about $7 a day. All the working days in the week have to be paid for, whether the horses are used or not.

"On dynamite and powder the contractors charge a profit of about 100 per cent. of the original price, and on clothes the increase is about the same. I am prepared at any time to give detailed accounts from various contractors proving this statement."

The manner in which the interests of the victims of accidents and explosions are neglected is discussed at some length. Many deaths occur and little or no effort is made to locate the relatives. The system employed by the contractors is claimed to be primitive and the books in which the labor is entered up are of little value.

The foregoing is only the gist of the letter, but the statements are reproduced impartially. We cannot but think that if such letters as these appear in the public press and remain uneonfuted, the effect will be inimical to the interests of those connected with railroad construction. Indeed, it may help to develop a situation that will be a menace to the progress of our most important national enterprise. Without the personal knowledge of the conditions that would enable us to speak with authority, we cannot adduce any weighty arguments in favor of the contractor. The contractor himself is able to make the most abiding impression, and it will certainly be advantageous to hear from him at this time.

Skilled Labor for Concrete Work

The fallacy that concrete can be properly mixed and placed by any kind of labor under any kind of supervision is fast disappearing. A very pertinent clause relating to this subject appeared in the specifications for concrete work on a large contract recently placed with the Aberthaw Construction Company, of Boston, Mass. This clause is as follows:

All reinforced concrete must be constructed by laborers skilled in this special field and under the supervision of an expert in reinforced concrete construction. The loads and stresses in the proposed construction are high and while the design has been carefully prepared with due consideration of safety factors and accurate locations for steel, much depends on the manner in which the work is executed, and the engineer will not jeopardize the work by permitting incompetent workmanship."

Specifications as they Affect the Contractor

A paper entitled "Specifications from a Contractor's Point of View" was read a short time ago by James Parkinson, a contractor, before the Liverpool Architectural Society. Some of the points made in the following extract will doubtless appeal to quite a few of our readers:

A specification is always preceded by a number of conditions, pains and penalties, making the contractor responsible for every conceivable act or damage to property or life. With the majority of these conditions I agree, as it tends to make the careless contractor more careful regarding the scaffolding, etc. There are some clauses, I think, which require leaving out and others inserted in their place. First is that of the architect appointing himself the arbitrator as to the full meaning of the specification and drawings, which is binding on all parties without appeal. This, to my mind, is not fair between man and man, and deprives one of their rights to sue, and is contrary to common reason.

Second, a clause reading: "No compensation will be made to the contractor for any losses or increased outlay they may incur arising from errors in the said drawings and specification." Also another on the same: "If any portion of the work, reasonably and obviously to be inferred as necessary, shall not be expressly described, either in the quantities or on the drawings, the contractor shall execute the same in a satisfactory manner without any extra charge on the amount of estimate."

I think enough responsibility is placed on the contractor in being responsible for damage to property and life without being made responsible for the architect's and surveyor's mistakes and omissions in the drawings and quantities, with which he has had nothing whatever to do, except to have a casual glance at the drawings. I think every one should bear their own mistakes without trying to saddle others with them, and these clauses should be removed.

In place of the above conditions a clause should be inserted regarding the final payment. As a rule, we are kept an unreasonably long time for the settlement. I would recommend a clause something like the fellowing: "The accounts to be gone into and the final certificate granted within two months after the account is rendered, or 5 per cent. interest paid on the balance." I have been kept six to nine months when there was no reason why it should not be certified in a week or two. . . .

Another matter I wish to bring before your notice is the fact, no matter what sort of a job is expected on completion, the specification never varies; the best is always specified.

Now it is an undisputed fact that Mother Nature does not produce everything of the best quality; she always varies what she produces, which we, in our wisdom, divide and classify into grades or qualities. No matter what department of nature we look into, whether the mineral, vegetable or animal kingdom, there is always good, middling and indifferent, and each have their separate value on the market, according to the grade or quality. . . .

I have often heard the remark passed when an architect has found that his specification has not been adhered to and cheaper material substituted in place of that specified, "Have we got value for our money?" Now, to be fair to all concerned, that is not the question, "have I got value for money " The question is, "Have I got what was specified?" If not, you should insist on having it, otherwise it is not fair to those who tendered to faithfully carry it out.

Forthcoming Conventions

Jan. 24-27. at Winnipeg; Canadian Society of Civil Engineers.—Secretary, C. H. McLeod, 413 Dorchester street, Montreal.

Feb. 15-16 at Winnipeg; Canadian National Association of Builders.—Secretary, J. H. Lauer, Builders' Exchange, Montreal.

March 6-11 at Toronto; Canadian Cement and Concrete Association (convention and exhibition).—Secretary, Wm. Snaith, 57 Adelaide east, Toronto.

An Ottawa alderman declared last week that when the city engineer wanted to obtain the contract for small blocks of pavement he tendered low and when he did not want to take contracts for large blocks of pavement he tendered high. While we entertain nothing but the most friendly disposition toward City Engineer Ker, we can quite understand that if there is any truth in the worthy (or unworthy) alderman's statement, it is reasonable to ask whether such a system offers any inducement to private companies to put in low tenders. Ottawa is the proud possessor of a civic asphalt plant. The aforementioned alderman claims that this asphalt plant is not the protection to the city that it should be. He contends that something more is required of such a plant than an apparently good financial showing and that the plant should be extended so that the city engineer could bid with equal heart on all paving work. Then he says it would be a real guarantee of reasonable prices.

At Vancouver, B.C., 25 miles of water mains were laid in the city during 1910, according to the annual report of the waterworks engineer. The total number of water services put in was 3,065.

Handling Concrete During Cold Weather

Satisfactory Measures for Counteracting Action of Freezing—Additional Equipment Not Necessarily Expensive—Details of Various Methods Employed

By J. H. Chubb

Laboratory results, together with those obtained in everyday practice, show the folly of attempting to carry on concrete construction during the winter months without taking proper precautions to counteract the action of freezing. A given amount of heat expended in heating materials and protecting the work from freezing immediately after placing will be infinitely more effective than an equipvalent amount of heat expended in attempting to hasten the hardening of concrete that has been mixed with cold material and subjected during the next few days to unfavorable conditions.

A case is reported where it was possible to remove the forms from an upper floor concreted during favorable weather conditions late in April before those of the floor directly beneath, which was constructed during cold weather in February; yet the lower floor was subjected to the same favorable weather conditions which influenced the hardening of the upper one, and was, in addition, nearly two months older. During the construction of an 8-storey reinforced concrete building, where the work progressed at the rate of about two storeys in three weeks, it was found necessary to use eight sets of floor forms. While they were concreting the lower three or four storeys, the temperature was close to, but rarely went below freezing, and the contractors did not consider it necessary to heat materials or protect the work. During the concreting of the fourth storey the weather turned exceptionally cold. This was housed in with canvas, heated with salamanders and the water used for mixing concrete heated. An examination of the work showed that the concrete in the upper floors when but a week or ten days old, was stronger and better than that in the lower floors, which were many weeks older. Had the contractor taken the precautions at the beginning that were taken later on, only about half as much lumber would have been required for forms, and the extra cost of handling the work would have been but a fraction of that for these additional forms.

As the example of the benefit to be derived from the proper handling of winter work the experience of a contractor during the construction of a reinforced concrete bridge will answer. The bridge consisted of three 3-centered arches having a clear span of 110 feet each. While the arches proper were being concreted the weather turned quite cold, from 12 to 15 inches of ice forming on the river. Nineteen days after the centre span was concreted a warm rain set in, resulting in a flood which carried away the false work and centering for this span, but did not result in any damage to the bridge. The materials for the concrete were thoroughly heated, being delivered to the mixer at an average temperature somewhat above blood heat, and as soon as the concrete was deposited it was protected with a covering of tar paper and boards. The proper handling of the work in this case probably prevented the total destruction of the middle span when the forms were accidentally removed long before the intended time.

These and numerous other examples in every day practice clearly illustrate that winter work cannot and should not be handled in the same manner as summer work.

The proper precautions necessary to insure satisfactory results with concrete during freezing weather depend very much upon the class of construction, large plan mass work such as retaining walls and abutments, not requiring the same care and protection as thin walls, columns, beams and floor slabs. Elaborate and expensive plants for heating the materials and protecting the work have been constructed and successfully used on important work, but the additional equipment considered necessary for winter work is really comparatively limited, consisting simply of a sufficient amount of canvas for housing in or covering the work, salamanders or some other form of heaters for maintaining a temperature above the freezing point and some provision for heating materials.

Half cylinders of sheet steel set directly upon the ground in the form of an arch, make a simple form of sand heater, as also do lengths of metal culvert pipe closed at one end and provided with a short piece of smaller pipe for a flue. Sand and stone may be heated by piling directly upon pipe coils supplied with steam or by covering with tarpaulins and applying the steam directly to the material to be heated. Where the materials are delivered in cars excellent results can be obtained by this latter method. For heating water the common practice of relying upon a steam pipe placed in an ordinary barrel is not to be recommended, the water is generally used too fast to permit of its being properly heated by this method. A suitable tank should be provided, the water being heated by means of a coil supplied with steam from the boiler supplying the mixer engine or from one erected for this purpose. The size of the tank will, of course, depend upon the amount of water needed and the time required for heating it.

Satisfactory Methods.

Work can be successfully carried on during freezing weather by either one or both of two methods; heating the concrete materials and then protecting the work until it has had a chance to harden, or for temperatures but little below freezing by lowering the freezing point of the concrete. This latter method is probably the simplest and cheapest but not the best, and consists of adding some substances to the concrete that will reduce its freezing point. Anly those substances that have no effect on the strength and durability of the concrete can be used. Ordinarily salt is most commonly used for this purpose and experiments indicate that while the addition of a limited amount of salt retards the hardening somewhat and lowers the initial strength, the ultimate strength of the concrete is not affected by its use. Even when salt is used it is important that the aggregate be free from frost as it is impossible to properly mix such materials. Approximately one per cent. by weight of salt to the weight of the water is required for each degree F. below freezing, but more than ten per cent. of salt should not be considered safe and this amount is not effective for temperatures lower than 22 degrees F. Calcium chloride has been used in place of salt for the same purpose and apparently gives very good results. In one case where commercial muriatic acid was used to prevent freezing, a small amount of acid being added to the mixing water, the results obtained were not entirely satisfactory, and the present unsatisfactory condition of the concrete both as to color and strength, is undoubtedly due to the use of the acid. At any rate, the use of acid in this connection is not to be encouraged.

To insure satisfactory results during cold weather the material should be heated and the work protected until it has attained sufficient strength to withstand the action of frost, either the water, sand and water, or sand, stone and water should be heated. Heating the materials accelerates the rate of hardening, lengths the time before the concrete becomes cold enough to freeze and in temperatures but little below freezing will insure the hardening of the concrete before it can be damaged by freezing.

For heavy mass work, thick walls, abutments, etc., it is not necessary to heat the sand if it is dry and free from lumps of frozen matter. The water, however, should be heated, and if the concrete goes into place unchilled it will harden quite rapidly, as mass work retains its initial heat for a long time and additional heat is generated during the process of hardening. If the forms are tight and made of heavy material it will be necessary to protect the top or exposed surface of the work. This may be accomplished by covering with tarpaulin and applying a jet of steam, or by covering with boards, building paper or some other suitable material and applying a thick blanket of straw or manure. A thickness of from 10 to 12 inches of manure laid on paper or canvas will, if kept dry, protect work from freezing for days at a temperature as low as 10 degrees F. Manure should not be placed directly upon the concrete, however, as it is very apt to discolor the work and in some cases is thought to have caused a slight disintegration of the surface coming in contact with it.

As an additional precaution for keeping the work from freezing through the forms, a covering of building paper furred an inch or two from the forms has been found to be effective. Actual tests in practice have shown a difference in temperature of 15 degrees between the outside air and the space between the paper and the forms.

Careful Inspection Necessary.

Careful inspection of winter work is necessary before removing the forms and it must be remembered in this connection that frozen concrete, which, upon thawing, has but little strength, closely resembles thoroughly hardened concrete in appearance, and when broken frequently shows a fracture through the aggregate.

To prohibit placing of concrete when the temperature is near or below freezing, as is frequently done in specifications, causes unnecessary delays and imposes an unjust hardship upon the contractor. If concrete work it properly handled it may be successfully carried on irrespective of weather conditions. The cold weather clause in specifications, instead of prohibiting, should be so written as to permit of construction during freezing weather, provided proper precautions, which should be specified, are taken.

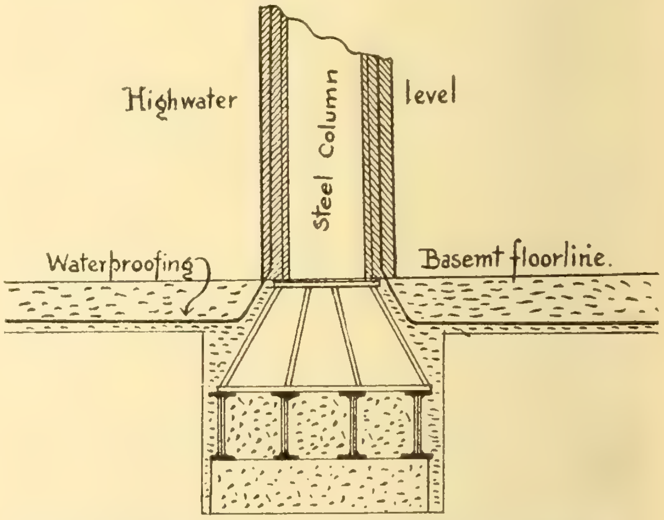
While winter work will entail some additional expense, depending upon the class of construction, there are also advantages to be obtained at this time of the year which compensate for this additional cost. Labor is very apt to be cheaper and more plentiful and the same is true to some extent of the materials of construction, deliveries of which are more prompt. This is a consideration of much importance, as those will affirm who have had work held up for weeks and the cost increased due to the delays in obtaining materials during the busy building season.

Where conditions and importance of the work will warrant this slight extra expense, concrete construction may be carried on during the severest winter weather with the assurance that it will be entirely satisfactory, providing proper precautions are taken in placing and protecting the work.

Membrane Method of Waterproofing

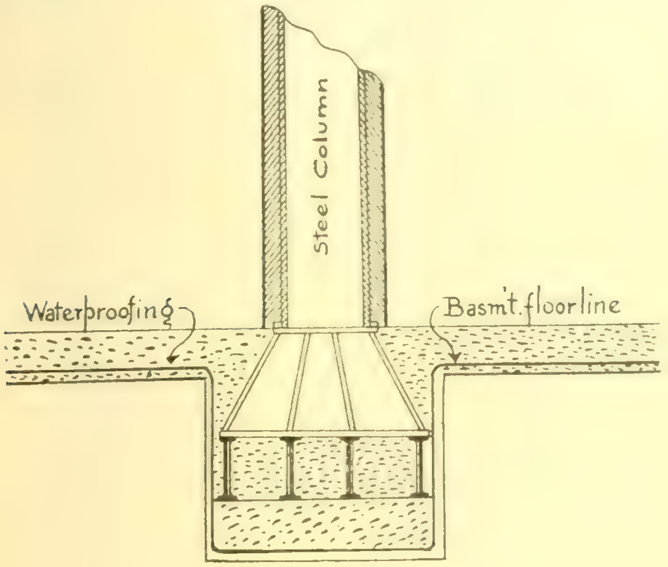
The subject of adequately protecting not only the rooms, areas, cellars and necessary pits occurring below water line in modern structures, but the structural members and elements themselves, from water and moisture, is receiving an increasing amount of attention from architects and engineers. It is also pretty generally realized that the danger from stray electric currents or other destructive agencies is real, and one that demands protective measures on the part of the designer. As a result, the practice of waterproofing with an insulating membrane the footings of columns and walls supporting and constituting a part of important structures is becoming the rule, whereas it was but recently the exception.

The change is in the direction of better construction and more permanent buildings, and therefore one to be commended, says the American Architect. In undertaking it the architect is confronted with the problem of materials and means, and upon his selections will depend largely the results obtained. The methods most commonly employed, from which it may perhaps be inferred that satisfactory waterproofing has been secured, at reasonable cost, seem to be those of using felt in a number of layers, stuck or cemented together with a cementing material possessing certain essential properties. The requirements of the felt are that it must be tough and durable, and at the same time soft and pliable. The cementing material must be of such a nature that it will absolutely repel water and moisture and be unaffected by it. It must also remain elastic and to a certain degree pliable in the coldest temperature, and yet be sufficiently firm not to soften and run when exposed to the heat of the sun in summer.



Older membrane method, leaving base of columns and footings submerged and exposed to possible injury from electrolysis, etc.

Manifestly such materials as are here described are not easy to manufacture or readily obtainable from a great many sources. It is of greatest importance, however, that materials designed for the purpose of water proofing possess the properties indicated, and it therefore becomes incumbent upon those to whom the responsiblity of making selection falls to test and examine the nature of the various materials available with extreme care. In this, as in all departments of building, the success or failure of the entire undertaking depends in great measure upon a wise and proper selection of materials.



Manner of applying membrane method of waterproofing now more generally employed

Cutting Structural Steelwork with the Oxy-Acetylene Flame

Nearly all of the steel superstructure of the Gillender building, New York, was taken apart by cutting out the rivets. The lower sections of 12 of the columns were not, however, removed by the subcontractor who handled the remainder of the structural steel work, and in order to provide clearance as quickly as possible for the installation of the pneumatic caisson foundation equipment, it was decided to cut off the upper portions of these columns about 40 feet long at a point just below the level of the street, so that the temporary working platform from which caisson operations were conducted and on which the main hoisting engines were located, could be installed before the lower portions of the columns and the grillages and girders on which they were seated were removed. The lengths and weights of columns also made them difficult to handle, so that this arrangement promoted the convenience as well as the rapidity of the work. The columns were cut off and some other similar work was rapidly and satisfactorily done by an oxidizing flame operated by the Oxy-Acetylene Appliance Company, New York.

Each of the columns had a 13x24-inch closed rectanglar cross-section of about 130 sq. in. made up with a centre web composed of two 18x¾-in. plates and four 3½x5x3½x¾-in. flange Z-bars and two pairs of 24x¾-in. outside cover plates. The working platforms were built around the columns just below street level and on them a torch was operated with which a horizontal cut was made through the column.

If the columns had been a solid steel member a single continuous cut could have been made with the flame, but as it was made up of a number of laminations or superimposed plates and bars, the joins between the units of material formed a serious obstruction to the cutting and made it necessary to cut off sections of the outside plates about 12 in. high vertically, exposing the outer surface of the inner cover plates, then cut off somewhat narrower sections of them, then cut the Z-bars and then the centre web plates from both sides to the centre, thus involving five cuts through the plates and four through the Z-bars on each side of the column, making 18 cuts in all, in addition to cutting the heads from sixteen ⅞-in. rivets, which were backed out afterwards. When the column was cut through, excepting the last cut in the centre web plate, the upper end of it was attached to the hoisting tackle of a derrick boom and a light strain taken to prevent it from falling when the last of the metal cut away.

Besides cutting off the 12 columns the acetylene flame was used for cutting four 12-in. I-beams, eight 20-in. I-beams, two plate girders 32 in. deep, and for cutting holes ni eight underpinning piles and also for cutting them in two in the middle. The underpinning piles were the regular 16-in. steel pipes, filled with concrete and were about 70 feet long. It was necessary to remove them to secure clearance for sinking the wall caissons, and it was found impossible to pull them by eccentric connections to the upper end, therefore the acetylene flame was used to cut two 2½x14-inch. holes to opposite sides of the shell near the top. The concrete between them was removed and heavy steel bars were inserted in the holes and jacks were set under the ends of the bars and operated to start the piles, after which they were easily pulled with the derrick tackles. Owing to the great length of the piles it was necessary to cut them in two for transportation, and this was easily accomplished by making a transverse cut with the acetylene flame through the 6-in. outside sleeve coupling. As soon as the coupling was cut the concrete broke and the pile separated into two parts. All of the above work was done by one torchman and helper working one week and an additional torchman working one-half week. The average speed of cutting with this flame is one 24x½-in. plate in 1 minute, but on heavy solid steel a speed as great as a 4½x4½-in. section in 1 minute has been attained.

This work was done with a portable plant including three acetylene safety cylinder like those used for car lighting apparatus and other purposes. Each cylinder was 12 in. in diameter and 26 in. long and contained 225 cubic feet of acetylene gas at atmospheric pressure, condensed to a pressure of 150 lbs. per square inch. These cylinders are two-thirds filled with an asbestos-like porous substance called acetone, which is a by-product of wood alcohol and has a capacity for absorbing 25 times its own volume of acetylene gas at atmospheric pressure. When the cylinders are charged with gas up to a pressure of 200 lbs. they can be exposed to heavy impact or great heat without danger of explosion, but when the valve is opened acetylene gas is delivered at a pressure here regulated to 150 lbs. This gas is mixed with pure oxygen at a pressure of 300 lbs., delivered from a cylinder of 100 cubic feet capacity. The mixture, proportioned 1.28 oxygen to 1 acetylene, is delivered through the nozzle of a special torch and makes a very slender flame developing 6,300 degrees of heat. The aperture in the nozzle varies with the thickness of the metal to be cut and for this work had a medium size of about 1/64-in. diameter. The flame is applied to the cutting line and when its temperature is raised to a cherry red a pure oxygen jet is applied at the same point through an auxiliary independent nozzle and rapidly oxidizes the metal, making a smooth kerf cut about ⅛ in. wide. The torches are made of brass pipes and fittings and are very light and convenient and are fitted with five sizes of nozzles provided for a considerable variety of work and enabling very complicated cuts to be made.—Engineering Record.

Unsafe Buildings and How to Treat Them

The Practical Part in Reconstructing Defective Walls and Similar Structures--An Example from Experience in the Case of a Party Wall

It goes without saying that the experience of a practical builder, covering a period embraced within the past 35 years, would be an extensive and varied one and exhibit many peculiar phases calling for the display of ingenuity and originality. Among these probably there is none more interesting than what might be technically termed "unsafe buildings and walls," and it is of these that the writer purposes to treat in the comments which follow.

Of "unsafes" there are many kinds, all of which are worthy of consideration by the architect, the building contractor, the engineer and the excavator. In fact, it is too often obligatory in these days, when old buildings and walls are being demolished to make way for modern structures, that all persons interested or connected with the work should possess a knowledge of how to proceed when such "unsafes" are either evident or develop as the work progresses.

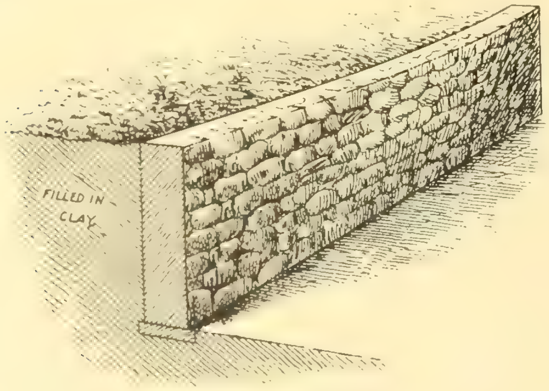


Fig. 1.—A common case of bulging wall

How do walls become unsafe? From experience we find that buildings and walls become dangerous and unsafe from many causes, among which mention may be made of the following: By bad judgment or haste in building; the natural decay of the constituent materials; by exposure to climatic changes and chemical action; by constant usage, wear and tear, as well as abuse, such as by overloading, neglect, lack of repairs, fires, etc.

Let us, however, first take up the most frequent cases and suggest how they should be remedied. Referring to Fig. 1 of the accompanying sketches the reader will observe a very common "unsafe." It represents a 24-in. stone retaining wall supporting a bank of filled-in clay or earth, which presumably is the substratum of a street or yard. Having been recently built and known as what might be termed a "green wall," it has succumbed to the literal pressure of the filled-in material. The ends of the wall being held fast by the right-angled or square returns cannot yield to this pressure, but the unsupported stretch of wall, say it be 25 feet, 50 feet, or 100 feet in length, must give way, so that the wall becomes out of plumb, bulged and unsafe, as represented in the picture.

This is one of the most common cases of "unsafes" and is caused by filling in the clay or earth before the mortar in the wall has "set" or hardened and before the wall has obtained its full bond. It is prevalent in yards which follow street grades and dip or slope, as represented in Fig. 2. It is a bone of contention between owners not alone on account of the matter of trespass, by reason of overhanging or being out of plumb, but also because of its being "party," as these the owner must himself preserve its integrity and arrange with his neighbor in the matter of injury or trespass. Now as to the remedy. When this condition becomes manifest on front retaining walls it is a very simple matter to shore or buttress such a wall with one owner to contribute to the expense of building a retain-

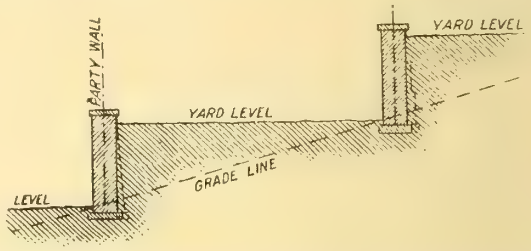


Fig. 2.—Section showing another cause of "unsafe" walls

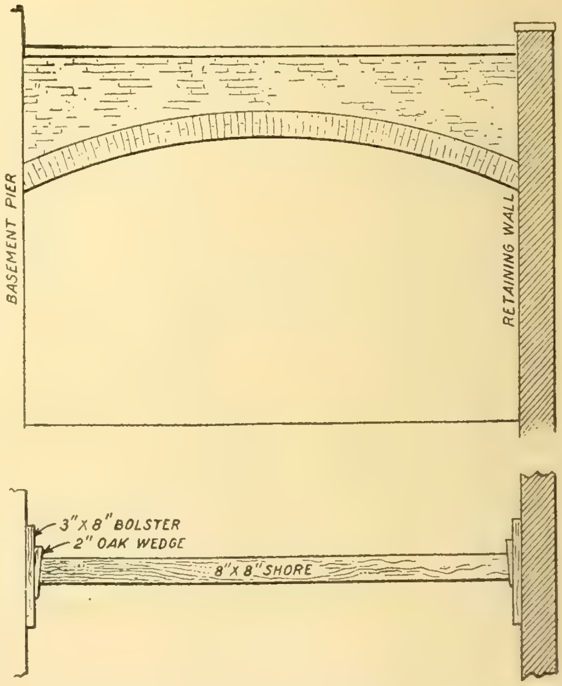


Fig. 3.—Method of shoring and buttressing a front retaining wall.

ing wall to support his neighbor's bank unless it is "party" or by mutual agreement to the benefit of both.

Now as to party walls. Let us take a case which actually came within the experience of the writer. In demolisihng a house built about 25 years ago, it was found that the east and west party 12-in. brick walls were about 8 in. out of plumb, leaning toward the east, as indicated in Fig. 4 of the drawings. It was the intention of the owner to rebuild the house, replacing an old-fashioned high-stoop, four-storey brown stone dwelling with a modern, basement dwelling, but what to to with the defective walls was the question. They were not necessarily unsafe, yet were defective in being warped and out of plumb.

After careful consideration it was decided to line up the west wall with brickwork, carrying it up plumb until it practically merged with the old wall and anchoring it to the latter with L-anchors and then fur out the old east wall with diminishing wood studding, thus preserving the perpendicularity of the interior walls.

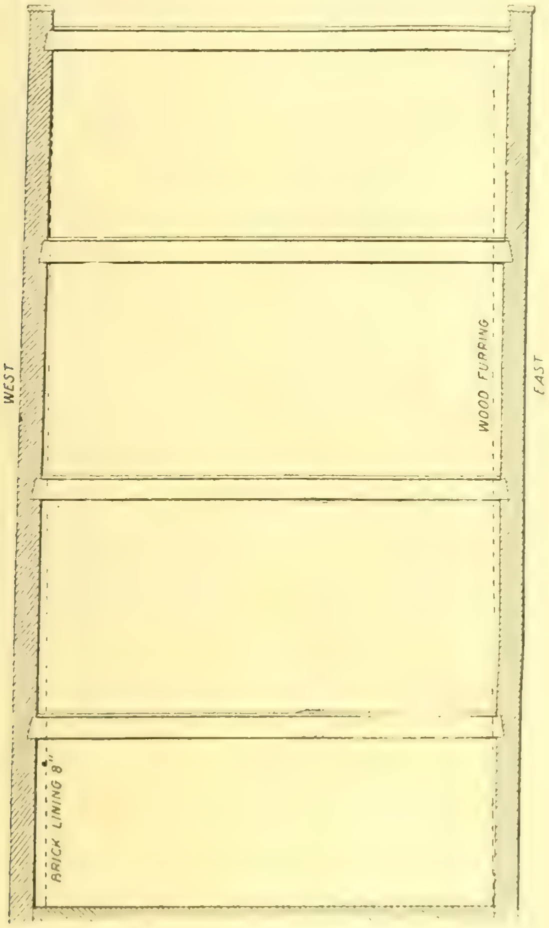


Fig. 4.—Showing how the perpendicularity of the interior walls of a building out of plumb was maintained.

It will be observed that this method maintained the integrity of the party walls without disturbing the tenants in the east and west dwellings adjoining.

Great indeed is the value of brick work, for it must be remembered that a brick wall properly anchored and tied, although out of plumb and solid in the mass, is not virtually unsafe unless both walls have passed outside the line of gravity. They will stand if kept exempt from jar and shock and the foundations secure from settling or slipping.

The matter of over-loading in the centre of the span between walls will, as has frequently been found, cause the walls to draw in or buckle. This can only be remedied by shoring with girders and posts set, if possible, intermediate between the walls.

Exterior and isolated walls and piers of buildings, if out of plumb, bulged, from unequal settlement, disintegrated by fire—or from any cause, in fact—must be braced, shored or needled. Broken or fractured walls of brick, concrete or stone must be rebuilt. In the case of the latter, if of rubble work, danger is never imminent; if of cobblestones of "nigger heads" it is dangerous, probably for the reason that the contraction of the mortar allows the stones to become loose and drop out by reason of their roundness and lack of bond.

Let us sum up the subject, by noting what is unsafe in timber. Of course its natural diseases, knots, shakes, dry rot, subsidence, etc., under strains are included in this category. Similarly, too, with iron, cast or wrought, and steel. Cast iron is brittle, hence in recent modern practice its comparative disuse, except, perhaps, for columns and lintels. Steel and wrought iron must, in spite of their wonderful capabilities, be protected and kept safe by coatings of paint, cement, concrete, etc.

And so it goes; the best part of a builder's practice is not always the actual construction, for he must not alone be experienced in this, but also be so well versed in a knowledge of the action of the materials used in the construction of buildings that he may know how to act and proceed when any kind of an unsafe wall, part of or even an entire building is brought to his attention for advisement.

Deterioration of Concrete by Oil

Engine breakdowns have been caused many times by the deterioration of concrete by oil, according to the report of Chief Engineer Michael Longridge, of the British Engine, Boiler & Electrical Insurance Company. Formerly most of the oil fed on the moving parts of an engine found its way over or through the engine foundations, he said, and softened the cement of the mortar or concrete. Eventually the foundations settled through the mortar shifting its place. This set up such strains in the bedplates that the latter finally cracked. Mr. Longridge recommends, in the case of concrete foundations, covering the concrete with strong cast-iron plates, with raised facings to receive the planed feet of the engine bed and raised edges to retain the oil and water. Where this is impracticable on account of its cost, he recommends the use of much broader bearing surfaces than are usual on the bottom of bedplates, or the use of more holding-down bolts with a pair of large accurately machined folding wedges between the bed plate and concrete at each bolt.

A smoke preventer, known as the "Torpedo" apparatus is described in London Iron and Coal Trades Review. This device is a hollow conical structure of special perforated fire-brick blocks supported in the combustion chamber just back of the bridge wall and in the direct track of the gases from the grate. Air is admitted from a pipe passing through the ash pit. The fire-brick blocks become red hot and the heated air readily combines with the unburned carbon and hydrocarbons.

In connection with the British Antarctic expedition, which left England last June in charge of Captain Scott, it is interesting to learn that the living huts and observatory for the expedition have been lined with two layers of Cabot's double-ply quilt. The houses must be as absolutely coldproof as possible and yet must be light in weight for ease in handling.

Depositing Concrete by Gravity Chutes

Description of Special Apparatus and Appliances used in Conveying and Distributing Material — Rapid Work and Reduced Labor

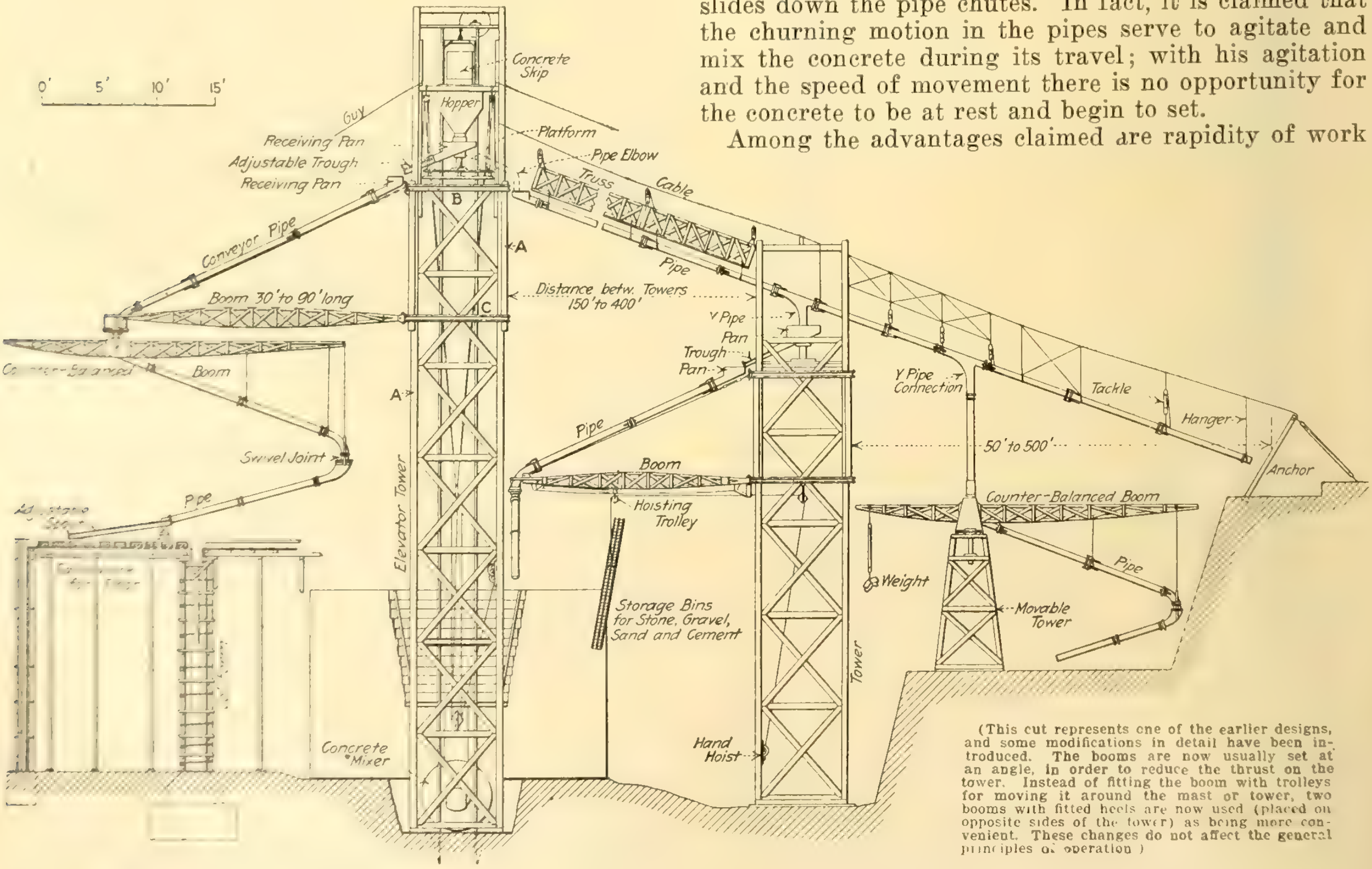
For handling and distributing concrete and delivering it into place in the forms, various arrangements of wheelbarrows, tracks, cars and elevators are used, while conveyors have been used in some cases. A method of an entirely different character is that of raising the concrete to an elevated point and then distributing it to the forms by inclined chutes, through which the concrete slides by gravity. This method has been employed on a number of works of varying character, and has been made a specialty by the Concrete Appliances Company, of St. Louis, Mo. While the method is used by other firms, this company has developed and patented special apparatus and appliances for the conveying and distributing of concrete by gravity. The accompanying details are by courtesy of Engineering News.

A typical arrangement of the plant on this company's system is shown in Fig. 1, but the booms are now set at an incline, to reduce the thrust on the tower. The elevator tower (rectangular or triangular in plan) is erected on a convenient part of the site. The concrete from the mixer is delivered directly into the automatic dumping skip, and at the top of the tower it is discharged into a hopper. From the bottom gate of this hopper it is discharged as required into a swiveling pan, and flows from this through a chute, or an elbow to receiving pans on the upper ends of the inclined conveyor pipes. These pipes are supported by booms, which also carry hoisting trolleys for handling the forms, etc. The pipe may end in a vertical drop spout for filling column and wall forms, or it may have a swiveling adjustable inclined spout for distributing the concrete over a wide area such as a floor surface. By this flexible piping system the concrete can be delivered close to or at a distance from the elevator tower, and it is stated that it can be delivered in this way to a distance of 500 feet. For long distances, the pipes may be suspended from overhead cables and supported by intermediate towers. The various arrangements metnioned are shown in Fig. 1, but for each job they are modified or adapted to suit the plan of the site and other conditions.

Means are provided for conveniently raising the hopper and pipes as the work progresses. Four vertical timbers (A), fitted against the posts of the tower and connected by the upper and lower trolley track (B) and (C), form a skeleton mast. This carries the boom and its guys, so that the mast and boom form a complete unit which can be raised by block and tackle as the height of the tower is increased. On some of the earlier work the boom step and guy were carried by trolleys, so that they could be moved to any side of the mast or tower. The moving was found to be inconvenient, however, and two booms are now fitted on opposite sides. The cage carrying the main hopper and receiving pan can also be raised by tackle. For buildings of small area, no booms are required.

There appears to be no trouble in the way of separation or segregation of the materials as the concrete slides down the pipe chutes. In fact, it is claimed that the churning motion in the pipes serve to agitate and mix the concrete during its travel; with his agitation and the speed of movement there is no opportunity for the concrete to be at rest and begin to set.

Among the advantages claimed are rapidity of work



(This cut represents one of the earlier designs, and some modifications in detail have been introduced. The booms are now usually set at an angle, in order to reduce the thrust on the tower. Instead of fitting the boom with trolleys for moving it around the mast or tower, two booms with fitted heels are now used (placed on opposite sides of the tower) as being more convenient. These changes do not affect the general principles of operation.)

Fig. 1—Typical Arrangement of Plant for Distributing Concrete to the Forms by Gravity Pipe Chutes.

and a reduction in the amount of labor required. The force for ordinary work will include two men at the material bins, one at the mixer, one at the hoist, one at the cage at the top of the tower, and two men handling the end of the discharge pipe (for each additional pipe there will be two more men). It is said that with this force of seven men, from 35 to 40 cubic yards of concrete per hour can be mixed and deposited in place. It is stated further that ten men under this system can place nearly twice as much concrete per hour as 35 men working with wheelbarrows or carts. The cost of delivering concrete in place by this system is given as 25 to 50 cents per cubic yard, as compared with 40 to 75 cents by wheeled carts and 60 cents to $1 by wheelbarrows.

It is to be noted also, that each batch of concrete can be deposited in place at one operation, instead of by separate wheelbarrow loads. The delays usually involved in such work by the wheelbarrow men waiting their turns at the mixer, the elevator or the dumping point are eliminated by this direct handling and distribution of the concrete. Other advantages are that large quantities can be handled quickly, the concrete in place is dense and homogeneous, the floor space is left unobstructed for the use of carpenters and other workmen, and damages to floors, etc., by wheeling over them, is avoided. The method is applicable to concrete and reinforced-concrete structures of all kinds.

In erecting a concrete building in Chicago, the Falkenau Construction Company used a main chute 10x18 inches, with auxiliary movable section in 13-foot lengths. All these were open troughs, and the main chute extended from an elevator tower. The company states that the minimum and maximum angles of the chutes were about 8 degrees and 25 degrees respectively. So far from the travel of the concrete in the chutes having any tendency to cause segregation, it appeared rather to mix the concrete more thoroughly.

The distribution of concrete by spouting was used in building the new plant of the American Sheet & Tin Plate Company, at Gary, Ind. This case is of interest and differs from the other works mentioned in that a portable mixing and elevating plant was used. We are informed by Mr. John M. Davidson, resident civil engineer of the company, that the plant used for this purpose by the contractors consisted essentially of a 1½-yard mixer mounted on a flat car and dumping into a bucket which was raised by an electric hoist to a height of about 70 feet. The bucket was then dumped automatically, the concrete falling into a hopper and passing thence along a steel-lined trough to an 8-inch swinging discharge pipe which permitted the depositing of concrete by gravity through the pipe within a radius of 50 feet. On account of the size of the foundations it was necessary in most cases to use a steel-lined trough at the discharge end of the spout in order to convey the concrete to all parts of the form.

The concrete was mixed very wet, as was the practice with other concrete on this work. No trouble was experienced from segregation of the concrete, but this was considered due in part to the fact that the concrete was spread by hoes to all parts of the form. It is believed that there would have been trouble of this kind if the concrete had laid where it fell, and if the forms had been narrow, but that such segregation would have occurred when the concrete was falling from the discharge pipe or spout rather than during its travel in the trough. The angle of slope of the spout varied from 25 to 50 degrees from the horizontal; as a rule the angle was about 35 degrees. Choking occurred occasionally at the flatter slopes, and usually at the flared end of the spout pipe which received the concrete discharged from the upper trough. While very good results were obtained with this portable arrangement, the time required to shift the machine detracted from its efficiency. It is considered that the most satisfactory work with the spouting process would be in cases where a great volume of concrete is placed from one position.

A very similar method has been used in building the retaining walls for the approaches to the Detroit river tunnel. In building the approaches to the La Salle street tunnel under the Chicago river, the work is done in open cut for the length of one block at each end of the work. Here the concrete mixer is placed at the edge of the cut (travelling along as the work progresses) and dumps the concrete directly into the head of a sheet iron pipe, the lower end of which has a movable section for delivering the concrete at any point within its reach. This method is used for the arches as well as for the walls.

Difficult Sewer Construction

In another column are given the methods employed for constructing sewers in wet trenches and opinions held concerning them by engineers in a number of cities. In criticism of these methods the Municipal Engineer has the following to say:

In our opinion the supporting of the pipe in such a way that it must act as a beam is more or less unsafe, where—as is likely to be the case—the back filling under the pipe is not so thoroughly compacted as to slightly lift the pipe from its bearing on the collars or wedges. It is true that good pipe has considerable strength to support loads as a beam; but on the other hand there have been a number of instances when it has been broken by the superimposed weight, and when so broken it is apt to collapse entirely. Allowing the pipe to rest upon its bell also seems to us unsafe. Possibly no part of an ordinary sewer pipe is more easily broken than the connection between the body and the bell, and there would, therefore, seem to be a possibility of the crushing of the under side of the bell and possibly a cracking of the body of the pipe by any considerable weight which may come upon it. Moreover, if the weight is supported by the bells alone, we have pipes subjected to even more beam stress than when supported by collars at each end.

One other possible danger in connection with the practices described by most of the engineers quoted is that of the plank or other timber decaying and allowing the pipe to settle. As all of these methods are employed only in wet trenches it might seem that the timber would always be submerged and consequently would not decay. We presume that in the majority of cases the ground water continues to stand above the level of the plank and this would probably be the case. Sewer trenches are known to effect more or less drainage of the soil, but it does not seem probable that such drainage would extend below the bottom of the sewer, unless there were a sub-drain, in which case it is not probable that the plank would be used. Even should it decay it would probably lose its supporting power and crumble so slowly that the earth would gradually work in and take its place, or else would have become so compacted around the pipe that it would support it even when the wood had lost all its strength.

Probably the best practice is either the bedding of the pipe in a somewhat lean concrete placed under and part way up it, or, if this is considered too expensive, the placing upon the platform of a bed of gravel, cinders or other porous material, as is done in New Orleans; this bed being so thick that the body of the pipe is supported without permitting the bell to rest upon the plank. Where there is no danger of the quicksand or other wet material rising bodily in the trench, but it is merely a case of soft material, any possible danger from decaying of the wood may be avoided by substituting for it burlap or bagging laid upon the soft material and covered with the gravel or other good bedding material; and the burlap serving to keep the gravel from mixing with the muck or other soft material below it.

There are, fortuntely, indications that engineers are coming to realize that it is not extravagant to spend a little more money in constructing a sewer under difficult conditions. Too many engineers and superintendents, however, still seem to feel that, having obtained a good sewer pipe, the work of laying it should be done as cheaply as possible, no matter what conditions may be encountered. A sewer is as important to the safety of the citizens as the foundation of a building, and a failure in the former is much less liable to detection. Good engineering, therefore, requires that as much thought, care and expense be given to the proper and safe construction of sewers as of any other municipal structure or utility. Moreover, the increasing number of purification and pumping plants and the increasing extent of articulation in sewer systems call for greater care in excluding ground water and make even considerable expense in securing this an ultimate economy.

An unusual wood floor has been discovered in a small building in Derbyshire, England. It was carried by beams supported entirely by exterior walls without intermediate columns for piers. The width of the floor was about three-fourths of its length and was carried on two longitudinal and two transverse beams, all of them spaced nearly equidistantly and none of them long enough to reach across from supporting wall to supporting wall. Each beam reached about two-thirds of the way across the building and was framed at one end into the middle of a beam at right angles to it, the other being supported on the wall. The four beams were thus framed together at their middle points, forming a rectangle concentric with the outer walls of the building and with each of its sides about one-third the length of the parallel side of the building. The beams were mortised and tennoned together at their intersections and were covered with diagonal flooring boards. Another unusual wooden floor 60 feet square is said to have been constructed in Amsterdam without any beams or girders whatever, except on the exterior walls, where the corners were tied together with iron straps. The floor was really a solid wooden dome 4 1-2 inches thick with a rise of only 2 1-2 inches at the centre. It was made of three crossed courses of 1 1-2 inch boards "grooved and fingered" together. The first courses were laid diagonally at right angles to each other and the third course was laid transversely, all three courses being nailed together.

Reinforced concrete pipe for waterworks has been used for the first time in Scotland in connection with the Loch Bradan water scheme, for supplying the boroughs of Troon and Prestwick and a large part of the county of Ayr. According to the Surveyor, the pipe is 18 in. in diameter and is laid at a gradient of 1 in 400. The concrete tubes are laid chiefly in cut and cover, although at one place duplicate lines of pipe extend through 100 yards of tunnel.

Road Foundations of Cinders, Logs, Plank and Slag*

The improved roads of this country having foundations of material such as gravel, cinders, broken field stone, brickbats, etc., comprise only a small percentage of our total mileage of improved roads. Broken stone, brickbats, gravel and materials scarified from old pavements or roads are the most common in brick and bituminous construction, as well as for regular materials employed for such foundations, and are sometimes used in brick and bituminous construction, as well as for regular macadam surfacing. The thickness usually varies from 4 to 12 inches of such material well rolled and it should be filled as much as practicable with sand or other suitable material. Unless the subsoil is very porous and well drained, it is essential that this class of foundation have an impervious wearing surface. This is especially true of the regions where a cold winter climate prevails, as they would then also be subject to the disintegrating action of water and frost.

Other miscellaneous foundations consist of logs, forming a corduroy road, or of planks. The latter are more common, as they can usually be built at a less cost and give greater satisfaction. Such foundations should only be used when they are necessarily kept wet all the time, as is the case in localities which have to be protected by levees and have water practically at the surface of the ground continuously. It is not practicable to build any considerable length of corduroy foundation on account of its cost being so much greater than one of plank. A corduroy foundation is made by placing logs in the ground longitudinally with the road and about 3 feet apart, to act as stringers, the upper surface of these logs to be as nearly level as possible crosswise of the road. Logs are then placed across and as close together as possible and spiked to the stringers.

A plank foundation should be built by having 3-inch by 6-inch stringers placed longitudinally with the road and about 3 feet apart. These stringers should be sunk in the ground so that their upper surfaces are level and even with the ground in the same cross section. One-inch boards should then be laid across the stringers at an angle and spiked to them, on top of which another layer of 1-inch boards should be laid across at the reverse angle and all spiked together. This foundation is then ready to receive the surfacing material, the thickness of which will vary according to the usual governing conditions.

All kinds of slag from iron and steel furnaces and ore smelters have been successfully used in building the foundations for roads.

The slag is usually taken in the crucible or pots in its molten state on a tramway from the furnace plant to where it is dumped. There it accumulates in great piles and is allowed to cool, when it becomes practically a hill or ledge of stone. These dumps are then quarried similarly as is stone, or powerful steam shovels are used to excavate them, and the slag is thus broken into suitable fragments to be used in the foundation of roads, or by being run through a regular rock crusher all sizes desired may be obtained.

The acid slags will only form a physical bond when consolidated by a roller, but the basic slags not only form a physical bond, but a chemical reaction takes place in them when subjected to the conditions which usually exist in the foundation of roads, and results in the cementing together of all of the pieces, thus forming a sort of concrete foundation. Therefore, such material forms an excellent foundation when due care is used in its construction. The results obtained have been so satisfactory that slag is being used for the whole depth of the road surfacing material, including the foundation, and in some cases experiments have been made with other materials to bind the slag surface. After more experimental work has been done in this line, it seems probable that such construction will be successful and economical in some localities.

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*From a report by Vernon M. Pierce, Chief Engineer U.S. Office Public Roads, presented at the Second International Road Congress at Brussels.

Methods of Laying Sewers in Wet Trenches

Practical Notes from the Experience of Numerous Engineers — The Plank and Wedge Method—Piles and Timber Foundations—Toronto's Practice

The American Society of Municipal Improvements, through its Clearing House of Municipal Information, has recently collected some information concerning methods employed in various cities in laying sewers in wet trenches. This was in response to a request for information concerning the advisability of laying sewer pipe upon plank and holding the same to line and grade by wooden wedges, placed back of each bell.

In New England, no engineers reported having used this method. The city engineer of Beverly, Mass., has employed iron pipe for wet trenches, the particular trench in question being in very wet, running sand. The pipes were blocked up at the bell ends until an inch or so above grade. The joints were then calked by oakum, followed by lead wool, after which two men using a piece of 6-inch x 6-inch timber as a rammer drove the pipe to grade. No other method was reported from New England, aside from the common practice there of first laying an underdrain surrounded by crushed stone or gravel, thereby draining off the water from the trench and permitting the laying of sewers directly above it on comparatively dry ground.

Plank and Wedge.

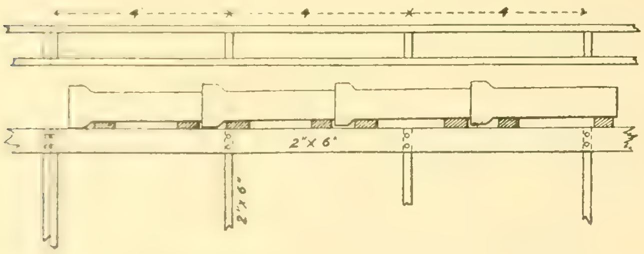
In the Central States a number of engineers reported having used the plank and wedge method. From New York one engineer reports that "In wet quicksand this is about the only plan I have found at all practical, but a trough or cradle was often necessary instead of simply a plank. Without such a foundation the pipes will not be apt to stay in place at all." Mr. E. B. Codwise, of Kingston, N. Y., states: "I have had 18-inch to 24-inch pipe sewers laid on a timber and plank foundation held in place by wooden wedges. Some such sewers were built 15 to 18 years ago and I have never heard of any trouble from them." From Elizabeth, N.J., Mr. W. H. Luster reports having laid 500 feet of sewer pipe in this way without having experienced any trouble. Among the Pennsylvania reports, Mr. B. E. Briggs, of Erie, states that in bad trenches of running sand he prefers to lay the pipe on plank, but block it up with dry earth; two pieces of 2-foot x 6-foot or 2-foot x 8-foot laid lengthwise of the trench being used. Mr. B. K. Finch, of Wilkes-Barre, has used the plank, but in place of wedges employs collars or blocks of wood having an arc of a circle sawed in the top to fit the pipe, which collars are placed under the pipe resting upon the plank. Mr. Harry T. Barker, of New Brighton, Pa., reports this method having been used very satisfactorily and states: "The plank ought to outlive the usefulness of the sewer which rests upon it." Still another states that his experience warrants him in recommending this plan, without giving details. In Wilmington, Del., practically this plan has been followed, and is reported by Mr. A. J. Taylor, chief engineer of the Sewer Department, to have given very satisfactory results so far as known. Mr. Hatton of that city writes somewhat at length concerning this method as follows: "I have supported miles and miles of sewer pipe in wet trenches upon timber foundation, laying a 2-inch plank on its flat side upon the sub-grade, and upon the top of this plank placing two cradle blocks under each length of pipe, if it to be 2 feet or 2½ feet in length, and three cradle blocks if it be in 3-foot lengths. These cradle blocks are usually made of 3-inch or 4-inch timber cut out to fit the external radius of the sewer pipe and toe-nailed to the plank on the bottom. In laying pipes under these conditions I am careful to have the bottom plank placed to precise line and grade, and then, the blocks being all of the same pattern and the pipes of uniform thickness, it is an easy problem to lay them all to a true line and grade.

"I would not recommend the use of wedges under the pipes because the stability of these wedges would depend entirely upon the manner in which they were placed by the pipe-layer, who is usually working under most adverse conditions, it being possible for the position of the wedges to be changed without the knowledge of the inspector; but if the cradle blocks are all made uniform the pipe layer cannot possibly make any mistake, as the inspector can readily see whether these blocks are placed under each pipe and toe-nailed to the foundation plank." Incidentally, Mr. Hatton states that he has recently done a considerable amount of work in wet trenches using for jointing material a mixture of cement with soft pine tar in the proportion of two cement to one tar, the mixture being worked up to the consistency of putty and inserted in the joint in this condition.

A number of engineers from the Central States report other methods of handling sewers in wet trenches. City Engineer Allen, of Syracuse, reports that his plan is to "Excavate from 6 to 12 inches below grade and fill in with bank sand and gravel; also fill around and over the pipe to six inches above the top with the same material. Joints are made with a special gasket and Portland cement." He has considered the plank and wedge method, but fears that it would not be successful in maintaining the sewers at grade and the pipe or bell would be crushed with the load. Mr. Theo. S. Oxholm, of Richmond Borough, N.Y., has used a foundation plank where the bottom persisted in squeezing up from the flowing sand, the plank being fastened to the sheeting to hold it in place. Wedges were not used, however. In Bronx Borough, N.Y., the plank foundation method has been used, but preference is given to a concrete bed "as the support is more uniform and there is less liability to breaking from unequal bearing." Professor H. N. Ogden, of Ithaca, N.Y., has laid pipe in V-shaped wooden troughs with concrete placed around and under the pipe. He believes the plank and trough method would be useful in many cases. Mr. Walter Greenalch, Commissioner of Public Works of Albany, N.Y., reports that in that city it has been the general practice, in the case of wet trenches, to lay sewer pipe on a concrete bed. His objection to the use of plank is that a much longer length of trench must be kept open while the plank and sewer pipe are being laid, whereas with concrete it is necessary to open the trench for only a few lengths at a time. Mr. R. A. McClanathan, city engineer of Niagara Falls, states that he has laid an 18-inch tile sewer in a 12-foot cut with three feet of quicksand at the bottom; in which case he "used planks of various lengths, usually not over 4 to 6 feet, being unable to bottom more than that length ahead of the work; wedging up the pipe temporarily just enough to hold and immediately bedding it and covering it to a thickness of 2 inches with gravel concrete. Six months after this sewer was finished I examined it and the greatest settlement found at any one point was about 1½ inches out of grade. The quicksand in this trench was very soft, so much so that I excavated a good part of it by attaching a hose to the hydrant, stirring up the sand ahead of the work and working it back through the pipe, afterwards scraping it out from the sewer outlet." The same engineer also built a 48-inch brick sewer in quicksand by using a plank cradle formed of three planks 10 inches wide and 10 feet long, laid to break joints. There was no appreciable settlement in this sewer.

Mr. Edward S. Rankin, engineer of sewers of Newark, N.J., reports having used the plank and cradle method, a cradle being placed under each end of each pipe. He believes, however, that there is danger of the pipe cracking with this style of construction unless very great care is taken in back filling around the pipe; also that they obtained as good results without this blocking up. The city of Plainfield, N.J., has formerly had considerable trouble with- sewers in wet trenches, and City Surveyor Andrew J. Gavett states ttat most of their sewers in wet trenches are now laid of cast iron. Mr. Edw. D. Rich reports that while city engineer of Summit, N. J., he used cradles consisting of two 2-inch x 10-inch plank laid flat and connected by cross ties of 2 x 4's spaced so as to have one come under each end of the pipe. Wedges cut to fit approximately the outside of the pipe were placed on top of the 2 x 4's to hold the pipe in line. In quicksand such cradles had to be braced to the sheeting to prevent their being raised above the grade by the upward pressure. "This method holds the pipe from 4 to 6 inches above the bottom of the trench, and if pumping is continuous the joints can be kept dry until set. Back filling should be carefully made around the pipe, and if the trench is deep the pipe should be concreted. The only objection I can see to the cradle method is that the pipe rests largely on the two points; and the back filling should be compact enough, whether of earth or of concrete, to prevent this."

In Carbondale, Pa., Mr. Benj. Anthony always puts a flat stone under the bell, using wedges for holding the pipe in position on this. Mr. N. S. Sprague, Superintendent of Construction of Pittsburg, states that their method, where a plank foundation is used, is to bed the pipes on concrete about 3 inches thick so as to insure a uniform bearing along the full length of the pipe. The use of wedges he considers bad practice. Mr. S. Cameron Corson, Borough Engineer of Norristown, Pa., advises sub-drains of tile or otherwise for draining the ditch, on top of which he would place concrete carried up to the haunch of the pipe, if necessary covering the pipe entirely after the joints have been properly connected. "In some instances most excellent results have been obtained by a plank reinforced with concrete, using bell-less pipe entirely, especially made or by breaking off the bells. If the special bell-less pipe is used on top of the planks, a cement mortar collar may be placed entirely around the joint. The water passes down the trench under the plank."



Plan Employed at Oak Park, Ill.

Possibly no city of the south has had more extensive experience with wet trenches than New Orleans. Mr. Geo. C. Earl, general superintendent of the sewer and water works construction there, describes their method as follows: "Our practice in laying sewer pipe in bad bottoms is to lay either a horizontal plank under the pipe or, if the bottom is very bad, floor over the whole trench bottom. The top of this plank or flooring is laid deep enough to give a good strong clearance for the bell of the pipe. Over this shells or gravel (porous material through which water will run freely) is spread and the pipe laid to grade there and filled around and up at least to the centre of the pipe with similar material. We prefer to have the pipe nowhere in contact with the foundation plank, sheeting or bracing of the trench." In Knoxville, Tenn., City Engineer Thompson has uesd the plank and block method and finds it satisfactory in some cases. Another method he has used "is to take out the soft material below grade and refill to a depth of 6 to 12 inches with steam coal cinders. Where cost is not to be considered, but it is desired to obtain the best results, or where foundation is very unstable, I would recommend a concrete base of 4 to 6 inches. Sometimes a cushion of sand, fine stone screenings, pulverized slag or cinders can be used to advantage on this base, in which to bed the pipe and render it less liable to breakage." Dallas and Austin, Tex., both report having had no experience with wet trenches, a condition on which they can be congratulated. Mr. F. F. Colby, city engineer of Chickasha, Okla., has laid a large amount of sewer in wet trenches and finds the plank and wedge method the best he knows of for holding the pipe in shifting ground.

Construction of Wooden Foundation.

Mr. W. F. Sargent, of Oak Park, Ill., reports having had considerable experience in laying sewers in saturated sand where the "well point' system was used with wonderful success (as at Gary, Ind., in 1908). In other cases he has supported both ends of each length of pipe on cross plank fastened to the sheeting. In a particularly difficult case a sewer was supported on a wooden foundation constructed as follows: 2 x 6 planks were driven as piles in the bottom of the trench every 4 feet, the 6-inch being crosswise of the trench, and 2 x 6 stretchers, with the 6 inches vertical, were nailed one to each edge of the plank piles, and with their top edges slightly below sewer grade. The pipes were supported on this by short pieces of plank laid across the trench and resting upon the tops of these stretchers. This plan he reports to have been perfectly successful in a 12-foot trench in sand which was completely saturated with water.

While a number of reports were received from Ohio(only one city, Columbus, reports using the plank and wedge system, stating that it works well. In Cleveland a timber cradle or grillage has been used in some cases, but in addition thereto a bed of concrete is made so as to insure a proper support of the pipe.

In Grand Rapids, Mich., the plank and block has not been used, but gravel is generally placed for a foundation where the soil is insecure. All reports from Kansas indicate that the trenches there are never wet enough to make this or any similar method necessary. Ogden and Provo, Utah, report having used the plank and block method and finding it satisfactory. City Engineer Rust, of Toronto, states that in that city the pipes are laid on planks, but are usually supported by concrete under and up to the haunches of the pipe. In some cases wooden cradles are used instead of planks, but here, also, the concrete bed is added.

Word has been received at Winnipeg that the first unit of the city's hydro-electric generating plant for Point du Bois is ready for shipment. It has been tested at the plant of Vickers Sons & Maxim and found most satisfactory. The testing was done under the supervision of Mr. Glasco, representing the construction engineers, and a firm of British experts, representing the city. This unit, and there are five of the same design, will develop 3,000 kilowatts, and the second unit will be placed on the testing floor at once.

Toronto's building business was greater than that of Detroit last year. City Architect McCallum has received the report from the latter city, showing that the permits issued there totalled a value of $17,250,000, an increase over the preceding year of 28 per cent. Here they were $21,250,000. The increase here over the preceding year was 16 per cent.

The Construction of Good Gravel Roads

Careful Survey and Suitable Plans the First Essentials—Equipment Required —Gravel Bed and Shoulders—Harrowing and Rolling—Maintenance*

A well graded and well drained earth road is necessary for the foundation of any kind of an improved road, therefore money expended on such work is not lost even though it be several years before the road receives a hard surface. In building any good road, the first essentials are a careful survey and suitable plans.

Grading.—The cost of grading depends upon the kind and amount of earth that must be handled and the distance it has to be moved. Where old roads have been regarded for the purpose of building state reward roads, the cost has usually run from $200 to $400 a mile—$300 being a fair average. A few hilly roads have been graded at a cost of more than $2,000 a mile.

Tools Required.—For rather low turnpikes no tool is so efficient as the road grader in skilful hands. For turnpikes with deep ditches, the flat, or Doan scraper, is excellent. This tool is not intended to move earth far, but spreads it evenly over the road when rightly handled.

The drag scraper is good for hauls up to 150 feet. Between that distance and 700 feet, wheel scrapers are best, but to use them economically, there should be enough scrapers working, unless moving soft sand, to keep a snatch team busy, and where the soil is heavy another team on the plow. For hauls longer than 700 feet it is cheaper to use wagons.

Drainage.—In most soils sufficient drainage is provided by building the ordinary turnpike with side ditches or gutters just large enough to provide for the free flow of water that naturally comes to the road. In clay soils the bottoms of the side ditches should be not less than 2 feet below the crown of the road, unless supplemented by tile drains. Especial pains must be taken to make sure that the ditches have free outlets.

Tile drains are a necessity in all springy soils. A 4-inch land tile along the upper side of the road to cut off the spring water before it reaches the road bed will usually prove sufficient. A line of tile can be placed on the other side later if found necessary. It is always advisable to cover the tile to a depth of 6 inches or more with gravel of cinders, and in very wet soils the drainage will be facilitated by filling the entire trench with some porous material.

In clay soils trenches should be cut through the shoulders described in the next paragraph, making outlets into the side ditches for water that may collect in the gravel bed during construction, and later before the surface becomes hard and waterproof. Such trenches should be 8 inches or more in width and slightly deeper than the gravel bed. They should be placed at all low points in the grade and not farther than 100 feet apart in retentive soils and filled with coarse gravel when the first layer of gravel is put on.

Gravel Bed and Shoulders.—After the rough grading and drainage above described have been completed the gravel bed should be formed in the central part of the road grade by placing shoulders of firm earth on each side and far enough apart to retain the proposed width of gravel, which the law provides, shall be not less than 9 feet wide nor less than 6 inches in depth. It may, however, be such greater width as the commissioner may specify and as deep as 12 inches if necessary, but where any greater depth than 6 inches is used the gravel should be put on in two or more layers as herein described.

Where the road grade is as high or higher than the finished road should be, the shoulders are best formed by scraping earth from the centre to each side with the four-wheeled grader. But first the road should be leveled by driving the grader back and forth on the centre of the turnpike, with the blade set square across, so as to cut off the high places and deposit the earth in the hollows, using the grader as a planing tool. A double row of pickets set 1 feet farther out on each side than the margins of the gravel bed, so as to clear the hubs and whiffletrees, is a convenient method of staking out the grader work.

If the old road grade is much too low, it is usually cheaper to regrade and turnpike before beginning to form the shoulders. But should the old bed be about the right height for sub-grade, shoulders may be formed by bringing up earth from the sides with the grader provided it can be spared from the gutters or ditches. If not, earth should be brought with scrapers or wagons from other places where it can be spared. Many places will be found where the centre can be notched out, leaving the undisturbed sides for shoulders, using the earth thus obtained to build up shoulders on slightly lower ground.

The shoulders thus formed should extend to the side ditches or gutters with the same grade and curvature as required for the finished road, viz.: an average rise of 1 in. for each foot of distance from the inner edge of the ditches or gutters to the centre line of road. Thus, an 18 ft. roadway would have a 9 in. crown and a 24-ft. roadway a 12-in. crown.

After the machine work above described has been completed, lines should be set up on the margins of the gravel bed and enough hand trimming done with mattocks and shovels to bring the gravel bed to the exact subgrade, giving it the same width and curvature as required for the finished road. Gravel is too expensive a material to fill hollows with, for they can be filled with earth from the shoulders for less money than gravel can be shoveled into wagons at the pit, and every high point protruding into the gravel means a defective place in the finished road.

Gravelling.—Next to proper drainage, the most important thing in building gravel roads is to secure a good quality of gravel. Authorities have differed as to the requirements of suitable road gravels, most of them in my opinion, placing too much stress on the immediate packing qualities. Indeed the average township commissioner and farmers generally have become so imbued with the idea that it is necessary to use a gravel that will pack quickly that they have almost lost sight of the fact that the only thing which makes a gravel road better than an earth road is the pebbles—real stones—that it contains and is dependent upon to bear up the traffic and resists wear.

The most common material sought after for the binder in gravel roads is clay. But, considering all kinds of weather, it is probably the poorest cementing material we have. If present much in excess of 20 per cent. of the mass it will make mud whenever there is a prolonged wet spell. Ideal clay gravels contain only enough clay to coat the pebbles, with no free lumps. Such gravels are excellent for the first layer on sandy soils, but sand gravels are much better for the first layer on clay and loamy soils.

Gravels that come from the pit with the pebbles cemented together, even though they contain no clay, will re-cement in the road and become harder than they were in the pit. Tests of [illegible] of this kind always show that there is much lime present and usually some iron, both of which are excellent cementing materials. Finally, the experience of the State Highway Department warrants the statement that there are few, if any, bank gravels in Michigan that do not contain enough

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*From the Third Biennial Report of the Michigan Highway Department [illegible] and other soft pebbles which grind up under traffic and furnish sufficient binder to cause them to consolidate in a few months time, if separated from the surplus sand and earth, and properly treated after applying to the road.

Testing Gravel.—To insure a sufficient pebble content the State Highway Department's specifications require that the gravel for the first course shall be good clean bank gravel, not less than 60 per cent. by weight, a larger per cent. if possible, of which shall be pebbles that will be retained on a screen of 1-8 inch mesh and pass through a screen of 2½-inch mesh. The gravel for the top course must be the same, except that no pebbles are allowed in this course too large to pass through a screen of 1½ mesh.

Screening Gravel.—Michigan is full of gravel pits which are too sandy to use pit run. In most cases excellent gravel can be obtained from such pits by screening, the cost of which can be kept down to a little more than double the cost of shoveling pit run gravel into wagons if cheap power driven portable screening plants are used. As the screened gravel is delivered into elevated bins from which it is drawn by gravity into the wagons there is no further cost for loading. Next in order of cheapness comes the wagon screen. This is a long screen about the length of the wagon box and 3 ft. wide, which is attached to the far side of the box. The gravel is shoveled over the box against the screen, allowing the pebbles to slide back into the wagon while the sand falls through the screen onto the ground on the opposite side. Hand screening is more expensive, frequently costing as much as 40 cents per cu. yd. for the screened product.

Applying the Gravel.—After the road has been graded and shoulders formed as above outlined gravel of the quality described should be put on the road in two courses and each course compacted separately.

Gravel will compact to about 80 per cent. of its depth, loose measure, as applied to the road, provided it is shouldered in and not allowed to waste away to the sides. If the compacted depth is to be 8 ins. and the width 9 ft. as required to secure state reward, it will take about 1,500 cu. yds. of gravel to the mile, and it is best to make the first layer 6 ins. deep loose measure, and the second layer 4 ins. deep loose measure.

To reduce the amount of spreading to the minimum it is advisable to place the gravel on the 9 ft. road bed by dumping two loads side by side, stringing them out just far enough to make the required depth. Thus, if two loads of gravel containing 1 yd. each are dumped on such a road bed, they will reach 12 ft. along the road and spread just 6 ins. deep. This requires only a very little drawing out of each load at the ends. Should the teams draw 1½ yd. loads, they would reach 18 ft. down the road and spread to the same depth, necessitating moving ahead about a wagon length to dump the second half of each load. The top layer would be dumped in the same manner, bearing in mind that to spread only 4 ins. deep the same sized loads will reach a half farther—making two 1-yd. loads each 18 ft. and two 1½ yd. loads reach 2 7ft. The distance two loads should reach is best gaged by setting little stakes the proper distance apart in the shoulders along the margin of the gravel bed. These stakes can be moved ahead as the work progresses.

Harrowing and Rolling.—Usually the gravel should be placed on the road commencing at the end of the road nearest the gravel supply so that the teams will aid in packing. As soon as the 30 or 40 rods of gravel have been spread on the road it should be harrowed with a spike tooth harrow, preferably one of the lever type. If but few teams are hauling, the harrow may be used twice daily—just before quitting time at noon and again at night. If a 100 yds. or so of gravel are hauled to the road daily, one team should be working on the harrow all the time. The harrowing should be done the same for both courses. As soon as the gravel has been well wet by rains it should be rolled with the best roller available. For this purpose a weighted field roller may be used if one can be had that is strong enough to bear weighting to three or more tons. A heavier roller of larger diameter is preferable, and where possible it is better to use a regular road roller, either of concrete or cast iron, weighing not less than four tons. In some places such rollers have been hauled with traction engines, the engine wheels doing as much or more compacting than the roller. Where a power roller is obtainable, it is better and more efficient than any of the others.

Each course should be rolled separately, commencing at the sides, rolling lengthwise of the road, but gradually working towards the centre. In the final rolling the whole surface of the roadway, including the shoulders, should be rolled and left in such perfect condition that water will flow without obstruction to the side ditches. The grader or float may have to be used at times to preserve the crown, but the harrow should be kept running until the rolling is completed, or until the gravel becomes so well compacted that the teeth refuse to penetrate the surface.

Maintenance.—Gravel roads completed in the prescribed manner may not become thoroughly compacted, no matter how well they are rolled, until after several months of travel—usually not until they have passed through one winter. During this formative period the road must be looked after and kept free from wheel ruts and hollows. It can usually be kept smooth by the systematic use of the plank float, the timber or angle iron drag, or sometimes by the careful use of the road grader. The last named tool often does much damage by digging up hard places, while the former tools only shove the loose gravel forward, gradually pushing enough of it towards the centre of the road to preserve the crown, but always depositing it where there is a hollow. Wherever there is an extra deep wheel track or other evidence of rutting and not enough loose gravel to completely fill the depressions, a little new gravel of the best quality should be put on before the floating is done. This work should always be done immediately after rains, preferably when water is still standing in the little hollows, as then they can be seen more readily, and at such times the gravel is in the best possible condition for packing and uniting with the hardened road bed. Such treatment systematically followed up will preserve the gravel road in as good condition as when new until the surface has worn down so far that it needs a new top.

About 7,000 miles, or approximately one-tenth of the total road mileage of Michigan, have been reported as surfaced with gravel. Some of these are very good and some scarcely better than common earth roads. This is caused, first, by placing gravel on improperly graded and undrained roads and, second, by using gravel which contains too much sand or too much loamy clay. Since the state reward road law became operative there have been built about 350 miles of gravel road which have received a state bounty. These roads have ranged in cost from a little less than $1,000 upwards to $3,000 per mile, the average being not far from $1,500.

The treatment of boiler water with lump and with hydrated lime has been tested by Mr. C. E. Thomas, general foreman of waterworks, Illinois Central Railroad, whose findings regarding the comparative merits of the two materials are embodied in a paper before the Illinois Water Supply Association. A test was made on 24 tanks, each containing 65,000 gallons of water; 12 tanks were treated with hydrated and 12 with lump lime, 3,432 pounds of hydrated lime and 2,808 pounds of lump lime being used. Although about 22 per cent. more of hydrated lime than lump lime was used, the lower cost of the hydrated lime showed a saving of about 2½ cents per tank over the lump lime. A more uniform treatment was maintained by the use of the hydrated product and the uncertain and deteriorating effects of storage upon lump lime were eliminated.

Municipal Construction at Fort William

Comparative Costs of Contract Work and Day Labor—The latter not an "Inefficient Monstrosity"—Methods and Cost of Paving

Some interesting comments on the subject of day labor, together with comparative costs on one or two examples of sewer construction, are given in the 1910 annual report of Mr. H. S. Hancock, jr., city engineer of Fort William, Ont. The report also contains a considerable amount of useful information on paving work, and the following general extracts from the various sections will doubtless be of interest:

The contract sewer on Amelia street, consisting of 692 feet of 15-inch tile and 1,296 feet of 12-inch tile averaged complete $6.68 per foot, while a similar sewer on Christina street with 1,200 feet of 15-inch tile and 300 feet of 12-inch tile cost only $3.70 per foot. Of course, the extra work on Edward street and two flush tanks probably accounted for an additional 50c. a foot to the contractors, and they undoubtedly made good money to which were largely avoided by their skill and energy, but, nevertheless, the comparison is a distinct tribute to the foreman on the Christina sewer. On Mary street, however, constructed during the last three weeks in about 15 inches of frost plus a macadam road to be picked and the bugbear of winter work in picking back-filling, the cost rose to $6.69. Of course it was all 15-inch tile as compared with 60 per cent. 12-inch tile in the case of Amelia, but it still fails to reveal any gross negligence.

The contract sewer on May street does not lend itself readily to comparison as the excavation was much shallower than either May or Brodie South, but considering that on these latter streets all sewer connections had to be reconnected from the old sewer to the new, I am more than satisfied with the showing made.

The Francis street-Edward street contract was undertaken by day labor after receiving the following tenders: J. J. Flanagan, $51,000; E. S. Rutledge, $51,685; Stewart & Hewitson, $51,750; Laidlaw & Grant, $54,000; Stewardson Bros., $60,761; H. R. Murphy, $62,000; A. Cameron, 64,145.

The actual cost without engineering and inspection is $40,232.54. Total cost including engineering and inspection $41,371.88, or a saving under the lowest price bid of over $10,000. The machine cost $5,200, and a charge has been made against this job for its use based on a life of five years and working 100 days a year, whereas its life is more likely to approach fifteen years. In any case, this decrepit organization has made something over $5,000 for the city and presented it with the machine. This also in view of the fact that a Lidgerwood cableway would have cost $1,000 less and saved over $1,000 of expense in crossing the C.N.R. track, a total saving of $2,000, an economy which I did not feel justified in effecting on this job as the Lidgerwood machine can not be used in trenches under eight feet in width, whereas the Carson machine we have purchased can be used in any of our trenches, and its future usefulness fully warrants the additional expenditure.

Sewer Purification.

Some time in the future, possibly five years hence, probably nearer twenty years hence, you will face the problem of sewage disposal. To attempt to treat sewage as suggested, with a septic tank at each outlet, is not practicable. When the time comes it will be necessary to instal a separate sanitary sewerage system from which the sewage will be pumped to the tanks and filtration beds. The present combined system can then be utilized for storm and flood water. This change, in my opinion, cannot be necessary for many years in the case of Fort William, in fact, may never be necessary as there is no question of the contamination of any water supply, but I wish to warn you that any attempt to instal separate disposal plants at each outlet can only be productive of enormous expense and continual disappointment. When the proper time comes a separate system [illegible] be necessary, but until then you should resolutely refuse to adopt any other scheme.

In this connection there has already been some comment on the pollution of the Neebing river. It is obvious that the increase of navigation on the Kaministiquia is rapidly driving boats and canoes from its surface. The Neebing river offers an alternative if the sewage does not become offensive by the disturbance of the water. My idea to overcome this objection and at the same time make this river the best stretch of pleasure water possible is to build an intercepting sewer down both banks of the river. These sewers would be perfectly parallel with their covers about three feet above the water level and these tops finished as a sidewalk and dock about twelve feet wide of reinforced concrete. Water for flushing could be drawn from the upper waters of the Neebing river. This would give you a pleasure canal, say, seventy-five feet wide, spanned by ornamental concrete bridges that would be superior to anything of the kind on the continent and the cost would be far less than you suppose. I would ask you to study this scheme and I think that in about five years you will be ready to carry it out.

H. S. Hancock, Jr., City Engineer of Fort William, Ont.

Roads, Pavements and Sidewalks.

During the past year the quantity of paving in the city has been practically doubled. Asphalt block has been used throughout, and practically all the main business streets in the centre of the city are now paved with this material. On Syndicate avenue centre pole construction was adopted for the street railway and all other poles removed from the street. This improvement combined with a new 12-foot reinforced concrete sidewalk [illegible] avenue has produced the finest street in the city. The cost of this work has been considerable, but is, nevertheless, [illegible] the amount of [illegible] necessary in some parts and the amount of fill [illegible] to reach the grade.

[illegible]

struction will outlive any other in this climate and subsoil.

The 12-foot walks built this year show a substantial saving over last year's prices and are certainly considerably less costly than a rockfill walk of similar width and depth of fill.

The 6-foot walks all show a higher cost per square foot than the 12, but this is only natural when one considers that the supporting walls of a 6-foot wal kare almost as costly as those for a 12-foot walk with only half the number of surface feet to share the cost. However, when the grade has to be raised to any extent, the superior results obtained by this method of construction fully warrant its use.

On the other hand, in strictly residential districts some cheaper form of construction must be devised, and I would suggest that residential concrete walks be built at the same time as, or after, the boulevard. Then make a shallow excavation of say six inches in which should be laid two inches of gravel or cinders, and on this bed a slab of 4-inch concrete properly reinforced and divided into sections five feet or six feet square. In case of settlement or raising from frost, the affected slab could be barred up and rebedded at small expenses without danger of breaking the slab. After the boulevard has been filled this construction should cost between 15c. and 18c. per square foot.

Macadam roads have been to a large extent held in abeyance this year as hard trap rock was difficult to secure because of the large quantities of rock used in other branches of construction.

Since the growth of automobile traffic, it may be taken as an axiom that the plain or water bound macadam road is not satisfactory either from the viewpoint of service or dustlessness, and that some binder of a cementing tendency is essential.

For cheap and effective road construction, I think the best of the bituminous binders is Tarvia X. It has been used in a large number of cities in Canada and has given good results on roads of ordinary traffic as distinct from heavy city traffic, for which a more substantial paving is necessary, and I think you will act wisely in laying some experimental pieces of this road.

Also, the Rocmac system of road making seems, on all the evidence that can be procured, to make an excellent roadway. The evidence from England and Scotland is overwhelmingly in its favor, but as it has only recently been introduced into this country, evidence is not so easily obtained. The city of Port Arthur has laid an experimental piece this season. The department of highways of the state of New York, who spend, I think, some ten millions of dollars annually on roads, state through their first deputy commissioner: "We built about a mile of highway under the Rocmac system in 1910. So far this road has been very satisfactory and we are seriously considering continuing the extension of this work next year. We feel justified in the way the road has turned out in giving it a more extended trial, and will do so next year."

The construction of the Rocmac road is somewhat similar to Travia X, but the bituminous binder of the latter is replaced in Rocmac by a solution, which, I understand, contains caustic soda, sugar, molasses and several other ingredients not divulged by the makers, and is mixed with carboniferous limestone to form a matrix, 15 gallons of the solution being thoroughly mixed into every cubic yard of limestone.

The preparation of the subgrade is of the greatest importance and must be thoroughly sound and compact. Upon this subgrade a layer of the matrix is laid, the amount depending on the finished thickness of the macadam, but approximately ⅞-inch matrix for 4-inch of 2-inch stone. The rock which should be trap, basalt or granite is then spread over the matrix and thoroughly rolled with a ten-ton roller until a slurry appears on the surface, at which time all the voids of the rock are filled with the matrix. It is undoubtedly a process worthy of the most serious investigation and it may possibly prove the ideal roadway of its type.

Several roads have been improved by gravelling or by a layer of crushed rock.

The following tables give details of cost and progress:

PAVING—

	Cubic Yards.	Rate.	Total.
Victoria ave. (Syndicate to Vickers)	4910.4	$3.89	$ 18610.42
Donald st. (Syndicate to Brodie)	1362.2	3.36	4587.15
Syndicate ave. (Victoria to Duncan)	10406.	4.63	48241.62
Donald st. subway	198.2	315	624.33
	16876.8	$4.27	$72063.52

Average rate per cubic yard for all paving constructed, $4.27.

The paving at present laid in the city, including that laid by the street railway department by years, is as follows:

1906	988 square yards
1907	5,878 square yards
1908	12,930 square yards
1909	4,216 square yards
1910	23,251 square yards
Total	47,263 square yards

BOULEVARDS—

	Feet.	Rate.	Total.
Syndicate ave. (Ridgeway to Duncan)	984	$ .65	$ 639.60
Archibald st. (Arthur to Ridgeway)	1106	.69	762.60
Dease st. (Simpson to McKenzie)	1050	1.34	1408.35
Syndicate ave. (Leith to Dease)	2604	.76	1981.77
Catherine st. (Arthur to Ridgeway)	1116	.66	741.36
	6860	$ .80.6	$5533.68

Average rate per foot for all boulevards constructed, 80.6c.

CONCRETE WALKS—

	Feet.			
John St. E. (Victoria to Miles)	6	2,700	38c.	$1,029.36
Miles st. s. (May to Brodie)	6	1,242	45c.	564.30
Frederica st. (Edward to Brown)	6	4,032	46c.	1,885.08
Miles st. n. (Simpson to Lane)	6	787	45c.	354.15
Cummings st. n. and s. (do.)	6	1,574	44c.	701.23
Victoria ave. n. (Vickers to Syndicate)	12	7,674	32c.	2,363.15
Donald st. n. (Brodie to Syndicate)	12	2,406	30c.	721.80
Donald st. s. (Brodie to Syndicate)	12	2,406	30c.	721.80
Syndicate e. & w. (Victoria Ridgeway.	12	39,408	30c.	12,177.06
		62,229	at 32.9	$20,517.93

Average rate per square foot for all concrete walks constructed, 32.9c.

Asphalt pavements in Berlin, Germany, aggregate about 45 per cent. of the total paved area of the city, according to a United States consular report. About 53 per cent. is stone pavement and 2 per cent. wood.

Artesian wells in London are being sunk by a number of firms in order to secure water at lower cost than it can be purchased from the Water Board. "The Builder," London, points out that the water level in the chalk formation has been falling at a rate of 2 feet a year, and that if the subsidence continues many of these private wells will cease to be effective after a time.

The writer has in mind two buildings, almost identical, one of structural steel and one of reinforced concrete, and both used for printing purposes. In the case of the steel building the vibration of the machinery may be felt and heard in the main entrance, whereas in the case of the reinforced concrete building, no such vibration is noticed.

The writer has personally stood next to a large printing machine on a reinforced concrete floor where a slight vibration could be felt in the floor within the particular panel where the machine was placed; but no such vibration could be felt in any one of the adjoining panels.—Exchange.

Consolidation of the Building Interests

President Nesbitt at Toronto—The Work and Aims of the C.N.A.B.—Preparations for the Annual at Meeting Winnipeg

On Saturday afternoon, January 7, an interesting address was given by Mr. E. T. Nesbitt, of Quebec, president of the Canadian National Association of Builders, before some sixty members of the Toronto Builders' Exchange.

Mr. Nesbitt visited Toronto on his return from London and St. Thomas. The former city is one of the most active workers in the C.N.A.B., and the latter Mr. Nesbitt succeeded in affiliating.

A short time ago, it will be remembered, Mr. Nesbitt, accompanied by Mr. J. H. Lauer, secretary of the National Association, took an extended trip through Western Canada with the object of trying to interest that section of the country in the important aims of the parent body and inducing them to promote the same by their affiliation and co-operation. The results of this tour and their bearing upon the future work and development of the Association were the subject matter of Mr. Nesbitt's address. Some account of this work has already been given in these columns from time to time, but Mr. Nesbitt gave much additional information that will be found of interest.

Mr. Nesbitt's itinerary covered 12,750 miles and the net result of the trip was the affiliation of the Regina, Calgary, Edmonton and Lethbridge exchanges. "During the past year," said Mr. Nesbitt, "we have increased our membership 100 per cent. At the time of our last convention the Association was comprised of six exchanges. Now there are eleven, representing a total membership of 1,200."

The meetings held at Winnipeg and the above cities were marked by the greatest enthusiasm. Elaborate preparations were made for Mr. Nesbitt all along the line, and what was even more gratifying than the wild duck suppers and sundry other little surprises that he encountered at various points, was the whole-hearted and responsive interest manifested in his objective. He spoke in the highest terms of the hospitality of the West and stated humorously that he had gained seven pounds in weight during his tour.

In dealing with the enthusiasm of Western Canada, Mr. Nesbitt emphasized very forcibly the responsibility of the East, urging those present to do their utmost to promote the welfare of the Association as a truly national institution and to forget the existence of the gap that had divided the East and the West in the past. In this way alone could the building interests of the country be consolidated. The labor organizations had forcified themselves in a manner worthy of emulation. At present, labor had the field almost entirely to itself. The master builders and their associations must be brought to see the value of co-operation, and organized so as to present a united front. Mr. Nesbitt considers that the time is opportune for the establishment of headquarters of the National Association, with a permanent secretary in charge. If a competent, live man were appointed, they would be notified promptly of all adverse legislation under consideration by the Federal or Provincial Governments and be in a position to take protective measures and to secure adequate representation. This matter is one of many important subjects that will be discussed at the annual meeting of the C.N.A.B., which, Mr. Nesbitt announced, will be held at Winnipeg, February 15-16 next.

Speaking of the forthcoming convention, Mr. Nesbitt expressed the hope that he would see a large number of delegates from Eastern Canada at Winnipeg, where extensive preparations are being made by the local exchange. The membership of the latter body is considerably over 400 and for the banquet which is to be held during the convention, seating accommodation is being provided for 650. The Winnipeg exchange has arranged to contribute a number of interesting papers, among which are the following:

"Technical Training," T. R. Deacon.

"Ethics of the Master Builder," Geo. W. Murray.

"Organization," J. W. Morley.

"Contracting, from a General Contractor's Standpoint," W. A. Irish.

Mr. Nesbitt enumerated some of the many important subjects that will come up for discussion at Winnipeg. Foremost of these was that of technical education. It was no good having skilled architects to draw up elaborate plans if there were no skilled workmen to carry them out. The decline of the apprenticeship system was a serious consideration and it would be necessary to provide better facilities and greater inducements for learning the building trades.

Mr. E. T. Nesbitt, Quebec, President of the C. N. A. B.

The policy of the Government in discouraging the immigration of skilled labor from England was criticized severely by Mr. Nesbitt. Pressure should be brought to bear upon the authorities, he said, with a view to the removal of all restrictions. His own experience was that not one "skilled" workman in twenty was properly qualified. The question was most urgent as the eight-hour law would increase the demand 20 per cent.

Another matter that would be discussed was the application of the Lemieux Act to industrial disputes. Mr. Nesbitt dwelt briefly upon the value of such an enactment in cases of strikes.

They would also endeavor to define more clearly their relations with the architects, and to arrange, if possible, for the principal issues, such as uniform contracts, details in plans, and so on, to be taken up with the Royal Architectural Institute of Canada.

Mr. Nesbitt is enthusiastic over the future of the C.N.A.B. and looks forward to the day when it will be as powerful a body as the Canadian Manufacturers' Association.

Further details concerning the convention at Winnipeg next month may be obtained on application either to Mr. Nesbitt, Quebec, or to J. H. Lauer, Builders' Exchange, Montreal. Mr. Nesbitt states that special arrangements are being made whereby the usual transportation rates will be reduced one-half.

Mr. Nesbitt issues the following open letter to the building and contracting interests of the Dominion:

To the Builders, Contractors, Supply Men and Building Exchanges of Canada

Office of the "Contract Record,"
Toronto, January 7th, 1910.

As president of the Canadian National Association of Builders, I take the liberty of addressing you this open letter on a matter of the greatest importance to you all. It is the question of organization. As this is the era of organization, without which nothing can be achieved, I ask you to join your local Builders' Exchange. Where none exists, I say organize one at once, and then affiliate it with the Canadian National Association of Builders. In it we have an association composed of eleven of the most important Builders' Exchanges of Canada, viz.: Quebec, Montreal, Ottawa, Toronto, London, St. Thomas, Winnipeg, Regina, Calgary, Edmonton and Lethbridge. It is only in its infancy and we aim to make it as powerful and influential as the Canadian Manufacturers' Association.

Heretofore we were as units distributed over the Dominion, without influence because we lacked organization and numbers, and therefore the power to impress governments with our views on legislation—often detrimental to our interests—that is being continually forced upon us.

When we think that the building business of Canada represented last year some $120,000,000, is it not time for us to wake up to the pressing need of organizing ourselves to safeguard our interests?

Questions of great moment to every builder and contractor are continually arising. Day after day such matters are before us, and we find ourselves powerless to deal with them because of the want of a central organization.

The annual convention of the Canadian National Association of Builders opens in Winnipeg on February 15 next. The Association proposes to perfect its organization and you are cordially invited to attend. If you have not a Builders' Exchange in your town, get together and form one, or else join the existing one in your nearest town or city. In any event, come to Winnipeg on February 15, and see and hear what is being done in your interest.

Yours truly,
E. T. NESBITT.

Water Filtration and Typhoid Fever

In their report on the purification of the Montreal water supply, Messrs. Hering & Fuller, consulting engineers, New York, made the following comments on the presence of typhoid fever germs in natural and filtered water:

Occasionally typhoid fever in scattering cases is found on the watershed of the Ouorean. The germs of this disease sometimes continue to be evacuated from the bodies of persons for months and years after their recovery. The infection of water is therefore likely to be more frequent than was formerly supposed. In the soil and ordinary waters as found in nature typhoid germs die quite rapidly as a rule. Some, however, will live for months. So far as present knowledge goes, the investigation of the most experienced workers in bacteriology indicate that this germ rarely if ever multiplies in water and soil as found in nature.

At the Paris Exposition in 1900 the German government presented statistics and charts making a comparison of the typhoid statistics in various German cities, grouped so as to make the different cities generally comparable with respect to conditions other than the water supply. Without detailing these various features, attention is called to the following statement of the average typhoid fever death rate per 100,000 population in German cities for the years 1896, 1897 and 1898, which is illustrative of the sanitary quality of filtered surface waters in comparison with ground water.

Filtered surface water: Stuttgart, 4; Chemnitz, 4; Berlin, 4.6; Altona, 6; Magdeburg, 6; Hamburg, 6; Bremen, 6; Brunswick, 8.3; Breslau, 8.6; Konigsburg, 17.6; Stettin, 20.6.

Ground water: Munich, 3.6; Dresden, 4.0; Charlottenburg, 4.3; Nuremberg, 4.6; Hanover, 5.3; Crefeld, 6.3; Elberfeld, 6.3; Aix-la-Chapelle, 7.3; Barmen, 8; Leipzig, 8.3; Cologne, 9; Mannheim, 9.3; Cassel, 10.3; Flensburg, 11.3; Strassburg, 12; Dantzig, 12.3; Holle, 13; Essen, 13.6.

On this side of the Atlantic, the experience of the past 15 years or more allows statistics to be presented which show, as did the hygienic exhibit at the Paris Exposition in 1900, that, with other sanitary conditions the same, it is possible by means of filtration to purify surface waters so that they will be substantially equal in purity to ground waters of the best quality. Such statistics are afforded from cities provided with sand filter plants, as set forth in the accompanying table.

Death Rates from Typhoid Fever per 100,000 Population in American Cities Using Filtered Water.

City	Plant completed.	Years averaged.		Typhoid death rate.	
		Before filtration.	After filtration.	Before filtration.	After filtration.
Sand filters.					
Albany, N. Y.	1899	10	9	90	22
Lawrence, Mass.	1893	7	15	114	25
Pittsburg, Pa.	1907	8	1	133	47*
Mechanical filters.					
Binghamton, N. Y.	1907	5	5	47	15
Cincinnati, O.	1908	4	1	50	16
Columbus, O.	1908	11	1	78	20
Paterson, N. J.	1902	5	7	32	10
Watertown, N. Y.	1904	5	5	100	38
York, Pa.	1899	2	8	76	22
Hoboken, N. J.	1905	7	4	19	14

*Including Allegheny, supplied with unfiltered water.

Ten years or so ago mechanical filters had their standing predicated to a large extent on results of laboratory investigations of an exhaustive nature. To-day modern mechanical filter plants which are well built and well operated show that communities adopting them have experienced as marked reduction in waterborne diseases, notably typhoid fever, as was the case when sand filters were introduced at Lawrence, Albany and Pittsburg. Representative results are also given in the foregoing table.

Vancouver City Engineer's Report

City Engineer Clement, of Vancouver, B.C., dealing with the work of his department during 1910, reports that 30.64 miles of streets were cleared and rough graded. In the southwestern section of the city 6½ miles of plank walk was laid.

The season's work on concrete sidewalks breaks all records in this line, 23.39 miles having been laid. This work was all done by contract by Messrs. G. Ledingham and M. P. Cotton & Co. The season's work on cement curbs totalled 2.47 miles.

The advance work in sewer extensions is very noticeable, many miles of sanitary drains having been laid. This work is classified as follows: Tile pipe drains, by day labor, 14.95 miles; by contract, 3.02 miles; brick and concrete sewers, by day labor, 2.12 miles; by contract, .85 mile; basement drains, .28 mile; box drains, 2,800 lineal feet; concrete culverts, 10; timber culverts, 16. In addition to the above list outlet sewers were built at the foot of Columbia avenue and Burrard street.

A feature of the report is the mention of plang roadways, a large number of which were laid this fall to meet the demand

1910 Great Year in Railroad Construction

Progress of the Canadian Pacific in Western Canada—N.T.R.'s Good Showing in New Brunswick and Quebec—News of Construction

The year 1910 was one of progress for Canadian railways as far as the laying of tracks and the building up of new grades were concerned. At the beginning of the year all of the companies had prepared plans for the building of hundreds of miles of new lines during the summer and more railway construction was accomplished in the year just closed than during any previous year. A good percentage of this work was carried out by the Canadian Pacific Railway. In western Canada alone over 1,330 miles of new grades were built during the year, and of these the C. P. R. built over 600, according to the following table:

Grading by Grand Trunk Pacific, 350 miles; by Canadian Northern, 380 miles; by Canadian Pacific, 600 miles; total, 1,330 miles.

In the east, between Coldwater and Orillia, and on the main line in the vicinity of Peterboro, grading operations are being carried on by the C.P.R. for a distance of 75 miles. A line was built from Coldwater to Victoria Harbor and at the latter point a million-and-a-half-dollar terminal elevator has just been completed, to be used in connection with the new grain route. The St. Maurice Valley line was extended from Shawinigan Falls to Grand Mere, a distance of five miles, and grading and track-laying operations were carried on between Ingersoll and Code Junction, four and a half miles. Between Montreal Junction and Adirondack Junction the line was double-tracked and work was started on the double-tracking of the bridge across the St. Lawrence river.

In Western Canada, on the Weyburn line, 45 miles of track were laid, leaving matters in good shape for eventually continuing the line to Lethbridge. Construction work was carried on on the line from Macklin to Outlook, a distance of 147 miles, track being laid for 90 miles from Macleod on what will eventually be a main line from Edmonton to Minneapolis and St. Paul. A bridge is being built at Outlook and in the coming summer a through service will be established.

In Alberta the grade of a branch from Carmangay to Aldersyde was built but no steel was laid. This work will be continued this year and will be finished early in the spring. From Irricana east a line 30 miles long was built, and the steel is being laid at the present time.

In Saskatchewan the longest stretch of line on which work was done was from Craven to Colonsay, 110 miles. Steel was laid for 50 miles and the work has now been suspended for the winter. The line from Regina to Craven was completed, and a good deal of work undertaken on the line from Craven to Bulyea. From Virden, on the main line west of Brandon, a branch 14 miles long, in a northwesterly direction, was opened for traffic, and from Tilston the grading on a 25-mile extension was completed. At Komarno, 29 miles of new track was opened for traffic to Arborg, on the Icelandic river.

According to a Vancouver despatch, track laying has been started on the Kettle River Valley Railway from Merritt southeast up the Coldwater river on the 30-mile contract held by Macdonell, Gzowski & Company. Grading is already proceeding ahead of the rails and it is the intention to have the whole contract completed within a short time. At present grading has been completed for twelve miles out of Merritt and the steel can be laid that distance, at least, without interruption. It is expected, however, that before the rails are down for the first twelve miles from Merritt the remainder of the grading will be in such a condition that the track work can continue straight ahead. The contractors have over 1,000 men on the job and are rushing it as fast as possible. Before this contract is finished the railway company will be asking for tenders for another stretch eastward from the termination of the 30 miles now in charge of Macdonell, Gzowski & Company, in order to reach the objective point of Midway within the least possible time.

The N. T. R. in New Brunswick and Quebec

Good progress is reported on the National Transcontinental in the provinces of New Brunswick and Quebec. Fully ninety per cent. of the total work on the 257 miles across New Brunswick and seventy per cent. of the 203 miles in the province of Quebec east of the St. Lawrence at Levis have been completed.

The first section west of Moncton, a distance of 50 miles, ending at a point near Chipman, which was awarded to the Grand Trunk Pacific Construction Company, and sub-let to Corbett, Floech & Company, has been fully completed, including track laying and ballasting, and so has the following section of eight miles, which has been built by J. W. McManum & Co., Ltd.

The third section to the westward, 40 miles in length, was first taken by the Grand Trunk Pacific Construction Co., but sub-let later to the Toronto Construction Co., and fully completed to McGivney Junction, where the road crosses the old Canada Eastern, now a part of the Intercolonial.

The Toronto Construction Company also built the fourth section in New Brunswick, a distance of 66 miles, and it will be to this point, 166 miles from Moncton, that the Transcontinental Railway will be opened during next year.

The fifth section was awarded to Willard, Kitchen & Company, and the grading has been almost completed by that firm from the Tobique River to the Grand Falls on the St. John River, some thirty-one and eight-tenths of a mile.

The No. 6 or last section in New Brunswick extends from Grand Falls to the Quebec province boundary—some 61 miles. Lyons & White are the contractors, and their track is all laid, although a good deal of ballasting has yet to be done. The work, however, is progressing rapidly at this point.

The next two sections to the west, numbering seven and eight, were given to Messrs. M. P. & J. T. Davis, who are building the substructure of the Quebec bridge. The first section of a little over 53 miles from the New Brunswick boundary has been sub-let to Messrs. Casechi & Pegano, and they have completed three-quarters of the grading and have also laid about thirty miles of track.

The Davis Brothers are building the final section of the Transcontinental east of the St. Lawrence to Point Levis, the distance being a little over 149 miles.

The substructure of all the bridges on these contracts are completed, and the superstructure furnished by the Dominion Bridge Company, the Hamilton Bridge Company, and the McNeill Bridge Company, of New Glasgow, is well advanced.

The right-of-way clearing on the C. N. contract from New Westminster, B.C., to Popkum, a distance of 57 miles, which was awarded to the Northern Construction Company, has been completed and the contractors are now engaged in grading operations. Over [illegible] men are employed between the two points, not including, of course, the clearing work at Port Mann, which is under a separate contract. Some [illegible] of the [illegible] in the grading gangs are located on the three-mile stretch

Sumas mountain, where the heavy rock work necessitates extensive side cutting. It is expected that the whole contract will be on the way to completion by spring.

An action in which C. Matheson, a contractor of Edmonton, is suing to recover $3,000 on a contract he held from one of the contractors on the Grand Trunk Pacific main line west of the Athabasca river, is to be tried in the Edmonton courts this month. Matheson was awarded a contract for three cuts in the rock work west of the Athabasca, which would have totalled something like $30,000. Matheson started to work early last summer, but was called off by the contractors who, it is said, gave him to understand that the work was not to be proceeded with until the grade had been completed to the Athabasca. Matheson claims that he is out $3,000 on the work that he did on the contract, and on other expenses. The case has been pending for some time.

Arrangements for the construction of the electric radial line between Ottawa and Brockville have been completed, and it is probable that the work will be begun next spring.

Proposed "Uniform Contract" for Quebec.

Important Negotiations Proceeding in Montreal.

Negotiations have been reopened between the architects and builders of Montreal, for the purpose of drawing up a "uniform contract" similar in effect to that which obtains in the other provinces. Two years ago negotiations for the same purpose were commenced, but were dropped when it was stated that the architects felt that the contracts used were sufficiently clear and were protected by the Civil Code. The Code Napoleon, however, which obtains throughout the Province of Quebec, is unsatisfactory, recent judgments having shown that architects' orders, even when written, cannot be upheld in a court of law, unless signed by the owner of the building.

A prominent builder told the "Contract Record": "The need for such a uniform contract is pressing, for very often a builder signs a contract full of technicalities and provisions he cannot understand unless he is a lawyer acquainted with the civil code. Then he practically signs his own death warrant unless the architect and the proprietor are willing to treat him right. Of course it cuts both ways and gives the builder occasional opportunities to get the better of the other side. Needless to say, opportunities for this sort of petty dishonesty are not wanted on either side, and we feel that they can best be wiped away by means of a uniform contract agreeable to all parties."

The drawing up of this contract has been put in the hands of Mr. S. Baudin, a capable commercial lawyer, who will submit same to both parties for consideration at a conference to be held next month.

Calgary Builders Must Wait for Warm Weather

Building Inspector Harrison, of Calgary, Alta., recently issued the following letters to the contractors and builders of that city: "At the present time there is a large amount of building being done, and contractors are rushing the work on buildings to completion. For the last few days the thermometer has registered below zero, and although hot water is being used for the mixing of mortar, and sand and gravel are also heated, I have lately seen brick laid in walls and the mortar frozen solid within a few minutes, and the brick practically impossible to move and I was forced to stop the laying of brick. I think it is now time that owners and contractors used some judgment in building during this bad weather. The placing of concrete in footings and brick in walls is in my estimation dangerous, and should not be permitted during zero weather.

"I have heard contractors claim that frost has no evil effect on brick or concrete work. I beg to differ. Even in this city during the past winter, concrete floors and brick and stone walls were built, and although special precautions were taken in the following spring, the concrete crumbled, and if any load had been placed on this floor, a big calamity might have occurred. In another case the brick walls, though built plumb and in a workmanlike manner during the winter showed the action of the sun in the spring, the ice coming out of the walls, and in a very short time these walls were completely out of plumb and showed cracks and settlement all over the building. In a case like this I might point out the impossibility of granting a permit for additional storeys to be placed on a building in this state. I think it is time, considering the importance of the buildings concerned, to take immediate action and not wait until some calamity has occured; I claim that it is my duty as building inspector of the city to stop any of this outside work when the thermometer is below zero, and to insits on proper precautions being taken between freezing point and the zero mark."

Personal News and Notes.

Jno. White, contractor of Eastview, Ottawa, succumbed recently to an injury received by a fall from his work.

The annual meeting of the Montreal Builders' Exchange will take place on January 23rd at 4 p.m.

Mr. H. Neville-Smith, C.E., of New Westminster, B.C., was recently presented with a handsome smoking set by the members of his staff.

Messrs. Bell & McCubbin, consulting engineers, St. Thomas, Ont., have opened an office at Chatham, Ont., with Mr. Geo. A. McCubbin in charge.

The Hon. L. P. Brodeur, Minister of Marine and Fisheries, and the Hon. Geo. P. Graham, Minister of Railways and Canals, will be the chief speakers at the banquet of the Montreal Builders' Exchange on January 18th.

At Calgary, Alta., the carpenters are asking for a further increase of five cents an hour, to go into effect on July 1. This would mean $4.40 per day instead of $4. The stonecutters are asking for an increase from 62½ cents to 65 cents an hour.

Mr. S. Robinson, C.E., left Edmonton recently via the Peace River trail for the interior of northern British Columbia, where he will spend the greater part of the winter surveying. He is accompanied by two assistants.

Mr. Charles H. Macmillan has been appointed general superintendent of the Dominion Steel Co., in place of Mr. W. C. Mitchell, who recently resigned. Mr. Macmillan, who is regarded as one of the best steel men on the continent, has been associated with the Schwab interests.

The death occurred on December 30th of Mr. Henry McDonald, railway contractor, at his home at 626 Dorchester street, Montreal. For many years the deceased was connected with construction work on the Canadian Pacific Railway and in recent years took an active interest in the development of the Northern Ontario mining regions, where he had several claims.

Medicine Hat, Alta., the town from which the weather emanates, reports excellent conditions. Much progress has been made in municipal work during the past year, especially in paving construction. During 1911 it is possible that an additional high pressure water plant will be installed. Everything is said to point to prosperity.

A recent visitor to Fredericton, N.B., was Mr. H. H. Charles, formerly resident engineer of the National Transcontinental Railway at McGivney. Mr. Charles is now at VanBuren, Me., where he is the engineer in charge of the construction of the new international bridge across the St. John river. The new bridge will be open for traffic about May 1st, the contractors,

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Messrs. Powers & Brewer, having made a record on the concrete work of the substructure, erecting 3,000 cubic yards in six working weeks.

The Winnipeg bricklayers have secured an advance of from 62½ cents to 67½ cents an hour. The pay for the other artisans, per hour, is as follows: Stonecutters, 60c.; carpenters, 45c.; plumbers, 55c.; plasterers, 55c.; lathers, 50c.; steamfitters, 55c.; painters, 40c.; electricians, 40c.; tinsmiths, 42½c.; builders' laborers, 27½c.; ordinary laborers, 25c.; team and wagon, 50c.; team drivers, 25c.; structural ironworkers, 40c. These figures are taken from the minimum fair wage schedule acknowledged by the provincial government and the Winnipeg city council on all public works for the coming year.

A year ago the J. I. Case Threshing Machine Company offered a free trip to the factory to two salesmen in each territory. The trip was a reward for the salesman selling the most goods for the year, and for the salesman showing the largest increase over the year 1909 in the territory he worked for that year. No one salesman was allowed to have both records. As a result, about seventy salesmen are now in Racine, looking over the plant and getting a line on the company's output for 1911.

An interesting letter on the subject of empty cement bags recently appeared in the Montreal "Gazette." The writer states that the bags in which cement is shipped to the Isthmus of Panama are returned to the manufacturers, who allow 8½ cents each for them. As fast as the bags are emptied they are loaded into box cars and taken to an old building, where a squad of twenty men, under a white foreman, are employed sorting and preparing the bags for shipment. Damaged bags are not thrown away, but are utilized by filling them with sand for the construction of dykes. All the bags are well shaken before being bundled up and this results in the recovery of about 60 barrels of cement a day, which is, of course, in good condition, and is used in the locks. These "shakings" pay the wages of the men. The writer suggests that there is a hint in the story for local contractors.

Messrs. Belliss & Morcom, engineers, of Birmingham, who have within the last few years introduced a steam turbine of their own design, report very successful progress. Within the last few weeks they have secured an important order from the Birmingham Corporation Electricity Supply Dept. for eight 1,000 k.w. Belliss exhaust steam turbines running at 1,500 r.p.m., to work in conjunction with a similar number of Belliss 1,500 k.w. reciprocating engines in the Summer Lane Station, Birmingham. Repeat orders have also been received for Belliss high-pressure steam turbines. The first Belliss high-pressure turbine built to a customer's order was for the Aston Manor Corporation, and gave such satisfaction that a repeat order was placed. Quite recently the city of Johannesburg, South Africa, placed a repeat order for a Belliss live steam turbine of 3,000 k.w. capacity. Messrs. Laurie & Lamb, Board of Trade building, Montreal, are Canadian agents for this firm.

The year 1910 was a prosperous one for the C.P.R., whose earnings amounted to nearly $101,000,000, an increase of between five and six millions over 1909.

The Montreal City Council has approved of the plan to erect on one of the public squares, a statue to the memory of the late King Edward VII.

The customs report just issued by the Revenue Department shows an increase of two million dollars in receipts over last year for Montreal, and eleven millions for the whole of Canada. Most of the increase comes from Winnipeg, Vancouver, Calgary and Edmonton.

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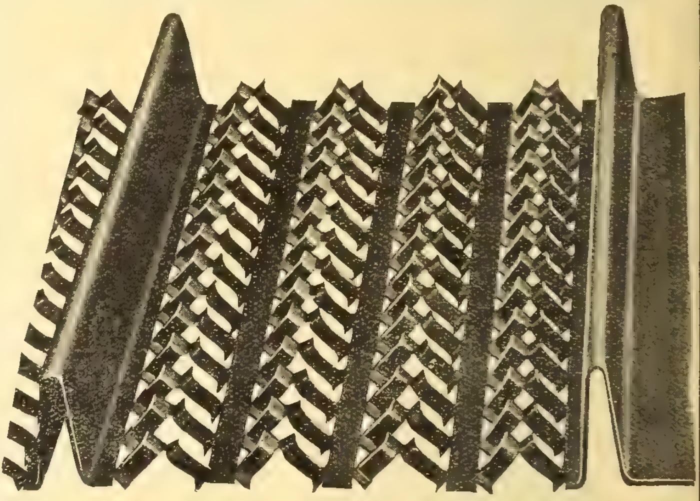

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Porous terra cotta bricks	15.00
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Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
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26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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No. 4½ Fuller's ....net 2.25
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Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

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16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

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Iron Pipe.

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¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

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Plaster of Paris, per barrel, delivered, $2.20.

Manilla Rope, best, per pound, 15 cents.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

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Pure Linseed Oil Putty, 25-lb. tins, $3.75 per 100 lbs.

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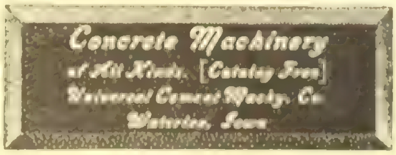
Pure Red Lead, dry, $5.00 to $6.00 per 100 lbs.

It is stated that about $50,000 is to be spent by the government this year improving the accommodation at Grosse Isle, the quarantine port below Quebec.

The 400 miles and over of the Transcontinental Railway, being constructed in the Province of Quebec north of the St. Lawrence by M. J. O'Brien and Allan R. Macdonnell, under the name of Macdonnell & O'Brien, will probably be completed during the fall of 1912, as this firm employs about 2,000 men, and the number on the work during the summer months has reached at least 2,500.



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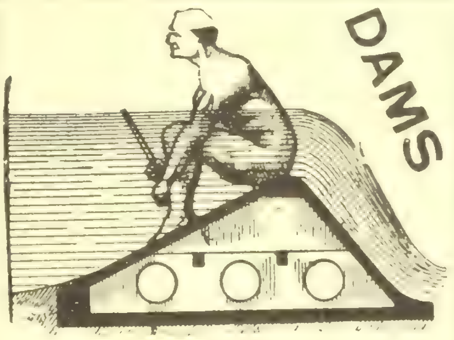

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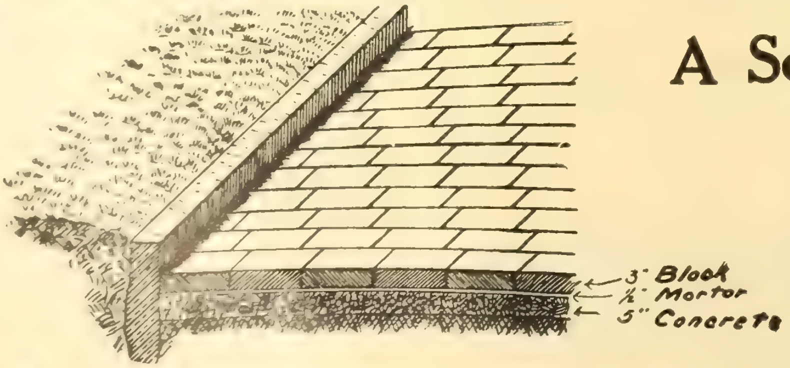

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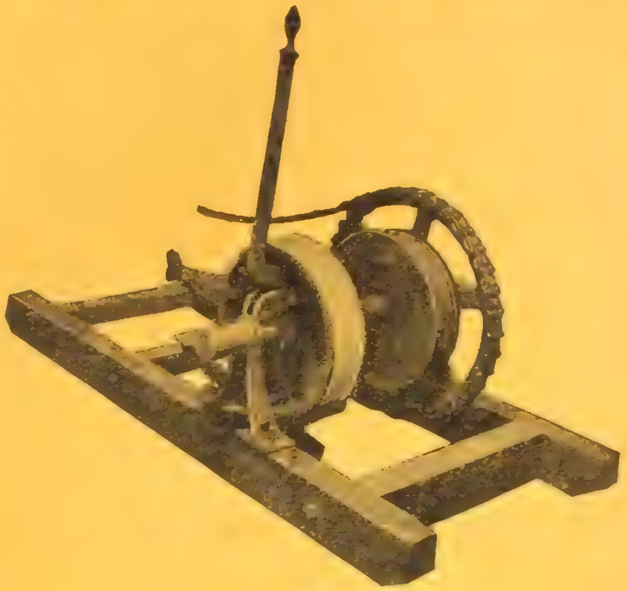

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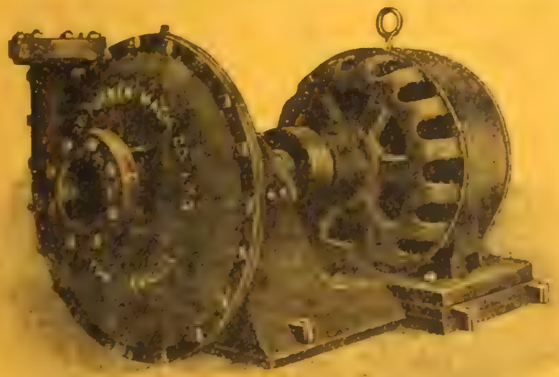

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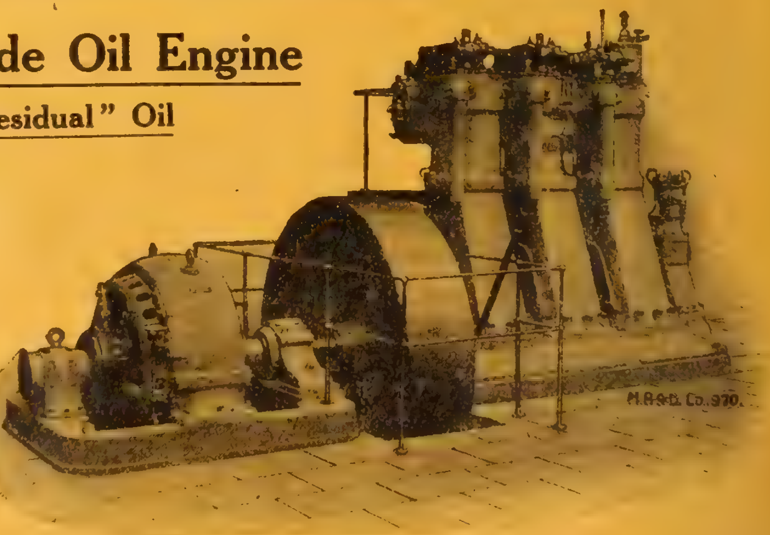

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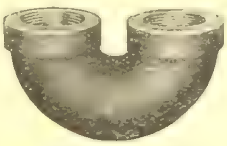
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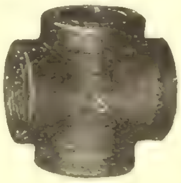
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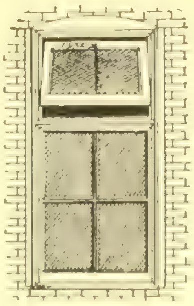

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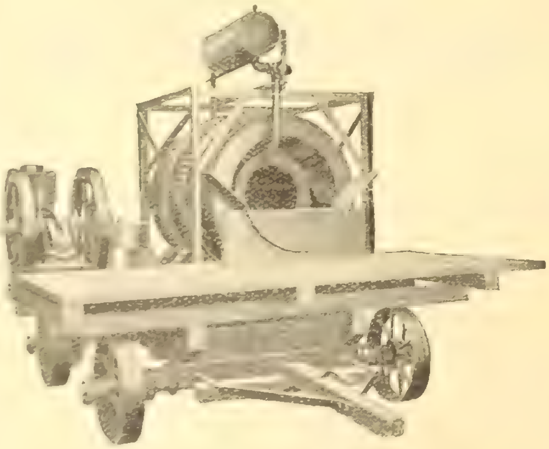

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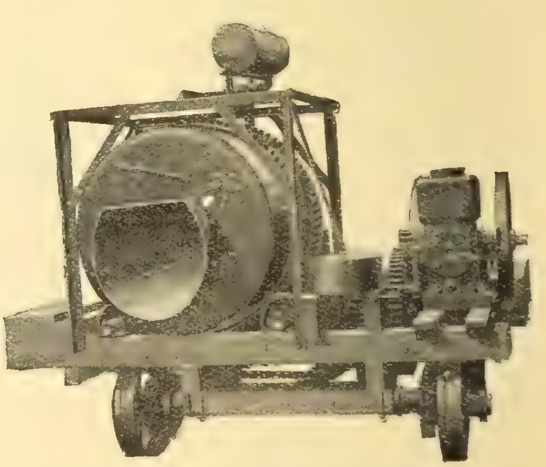

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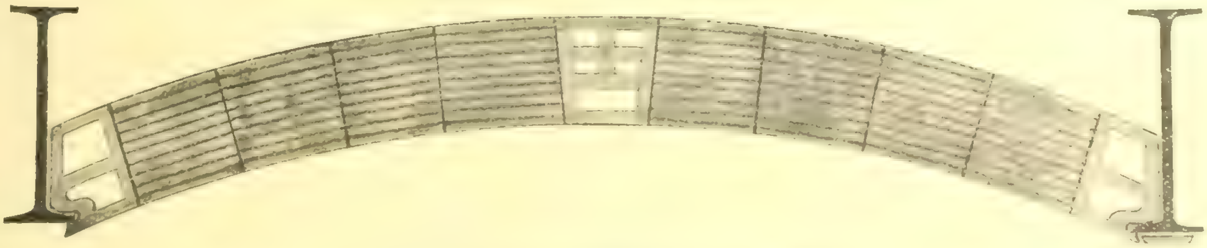

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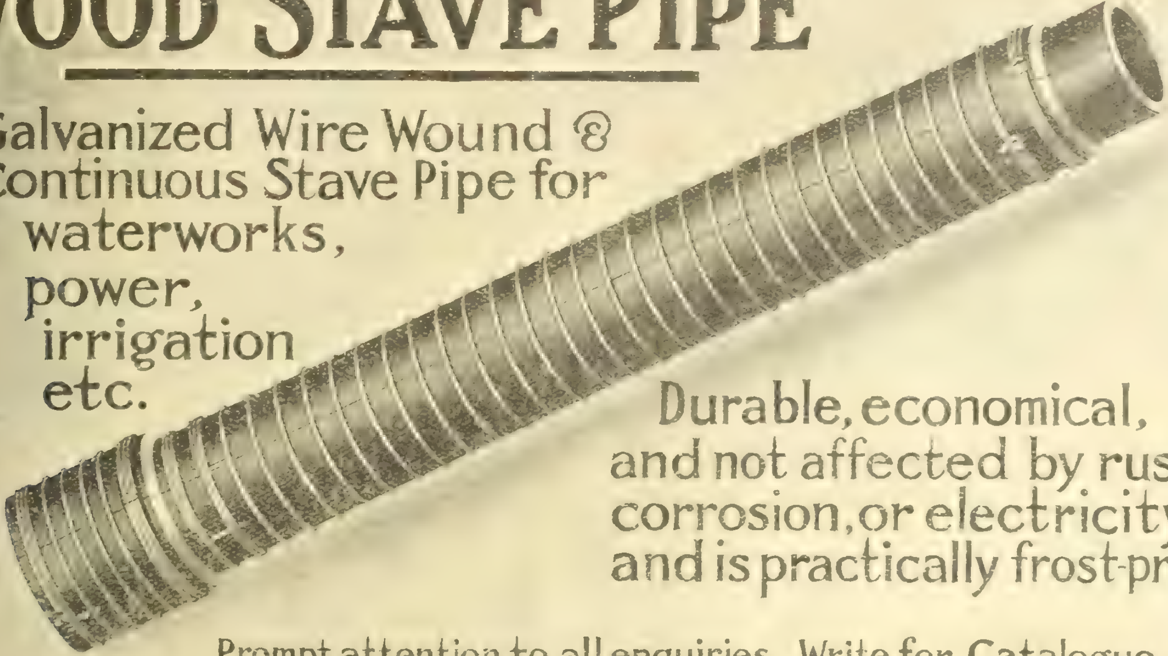
etc.



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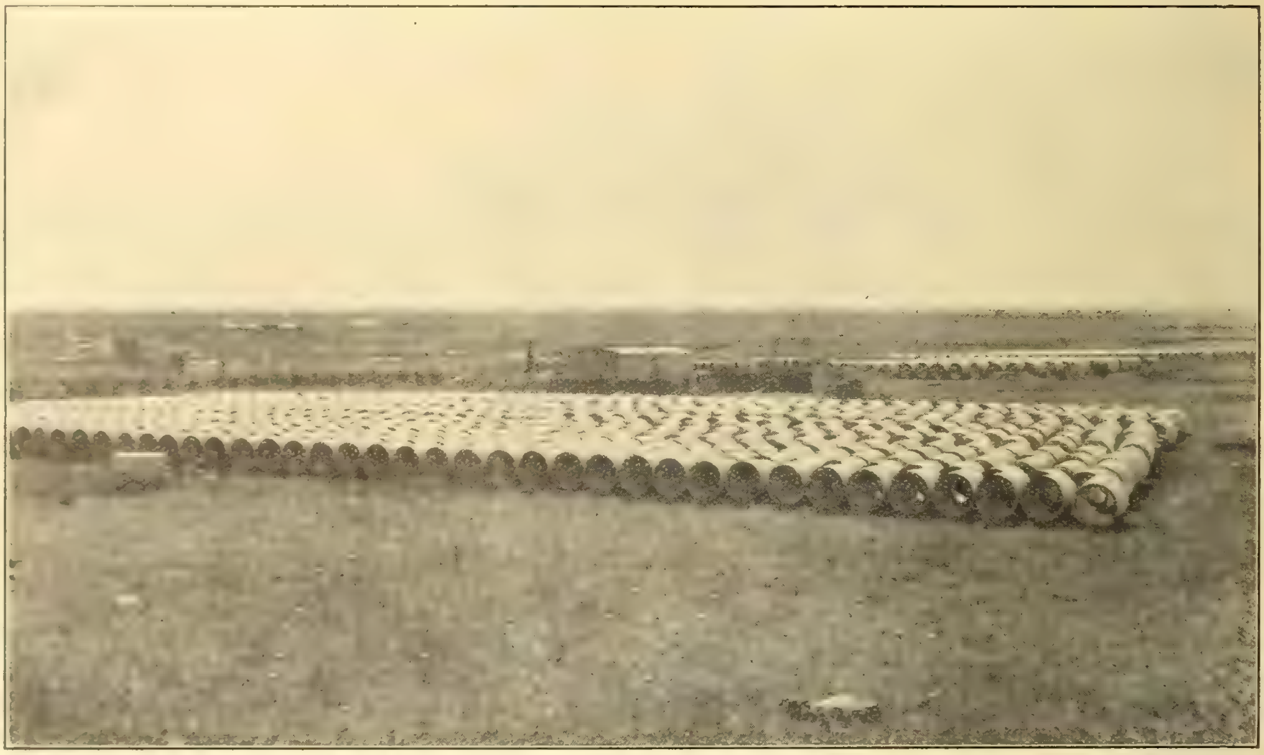

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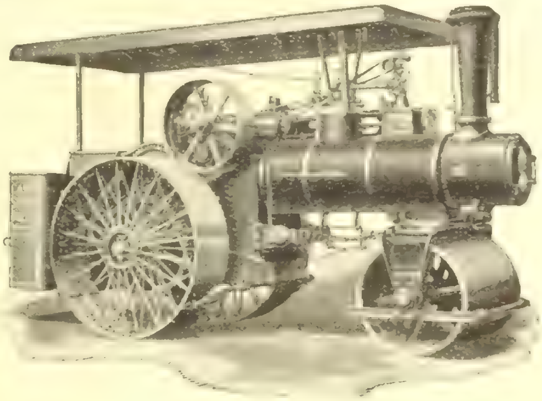

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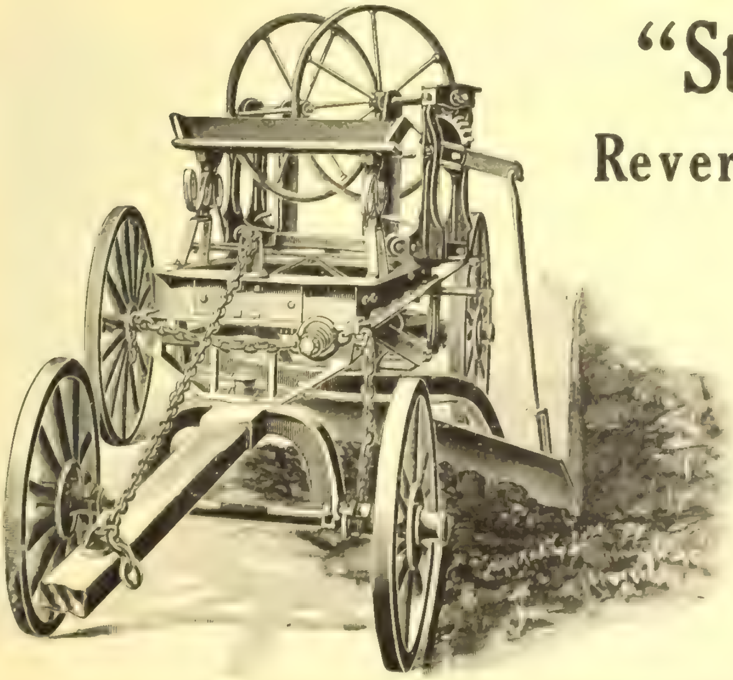

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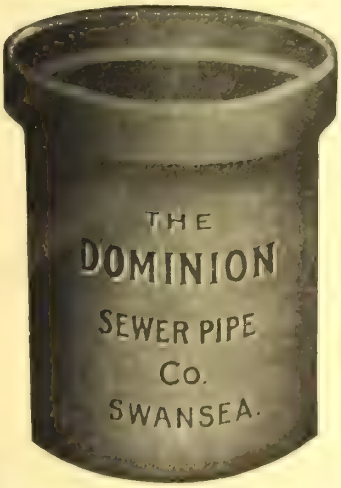

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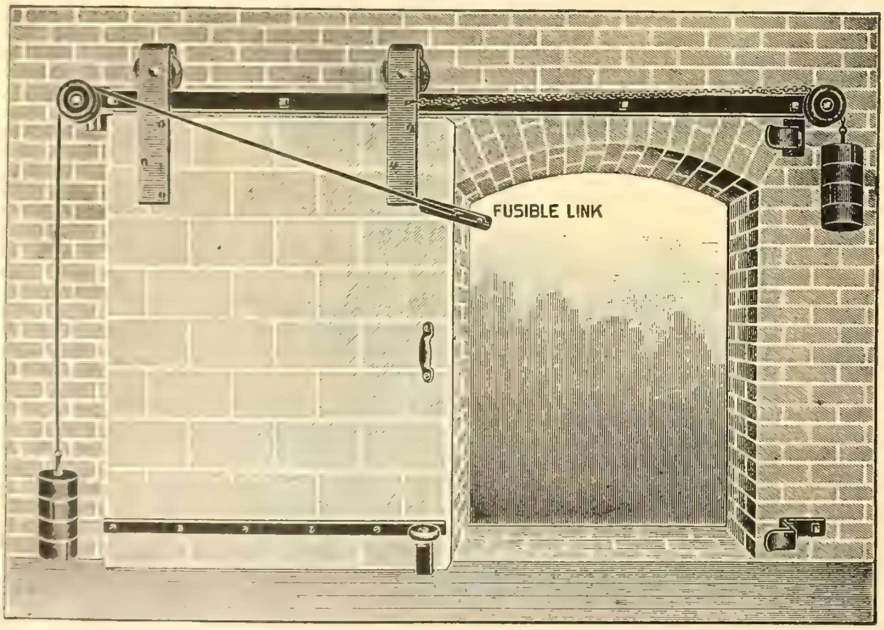

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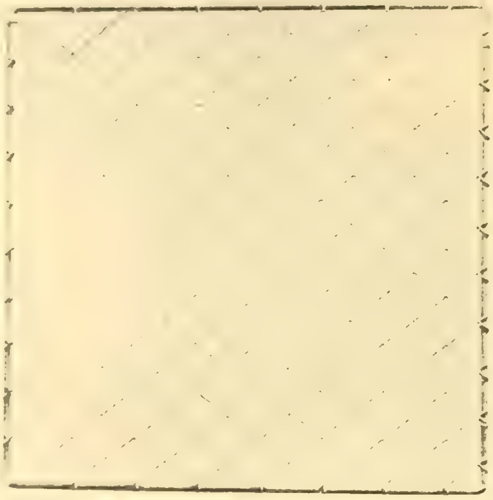

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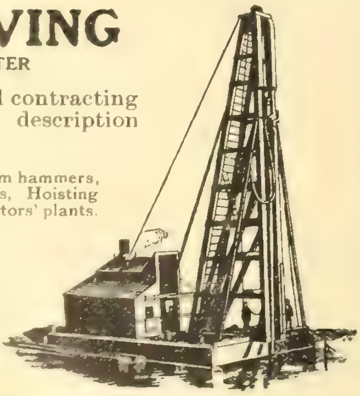

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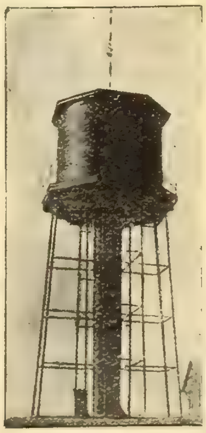

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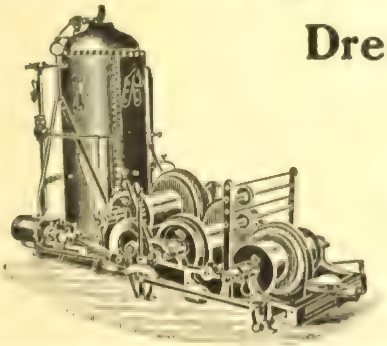

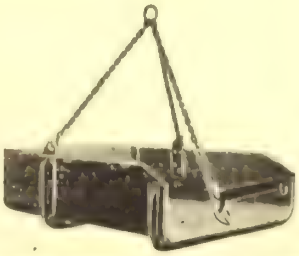

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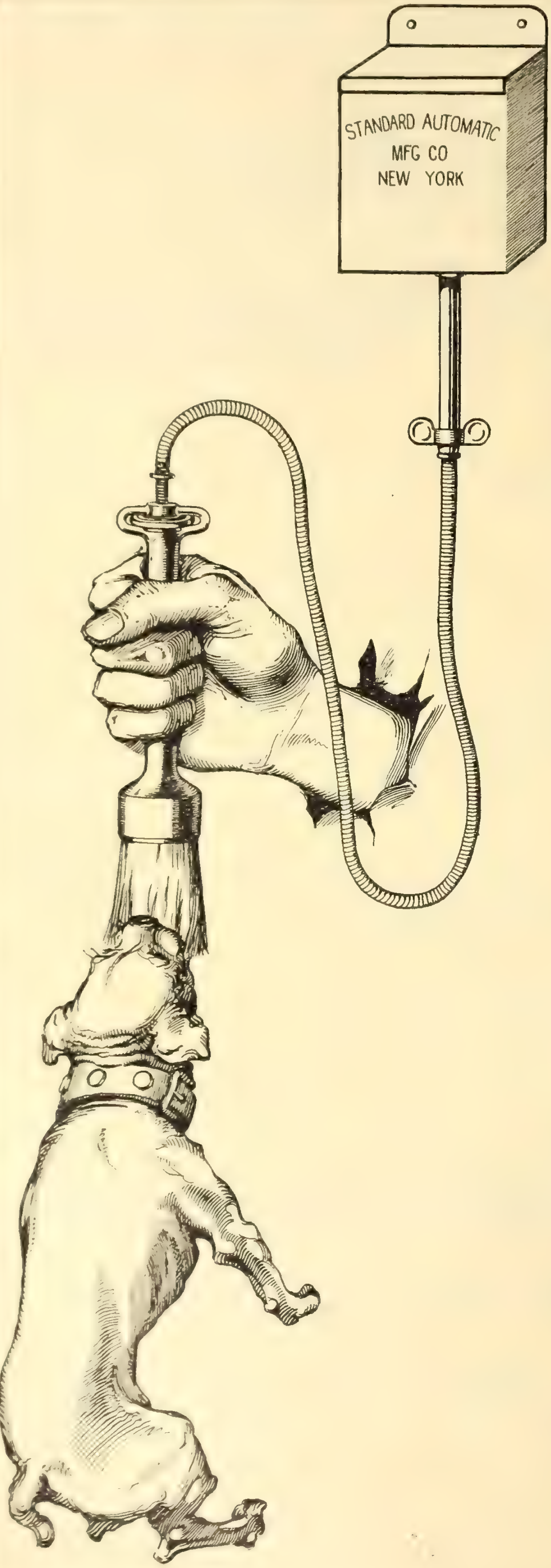

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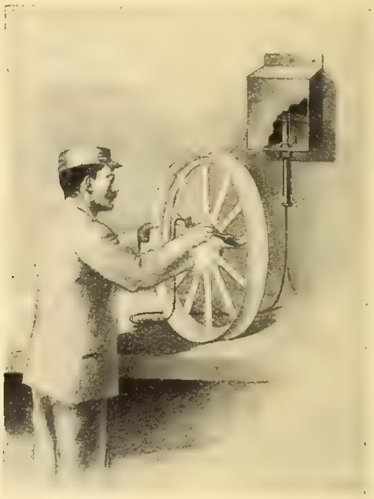

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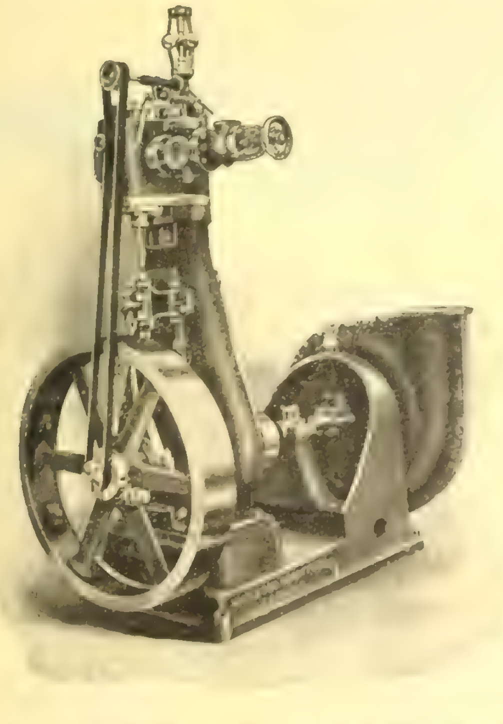

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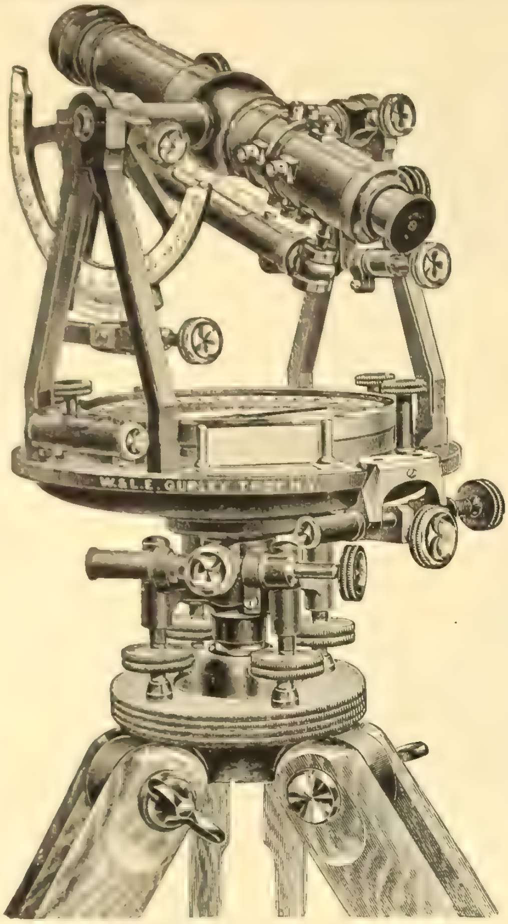

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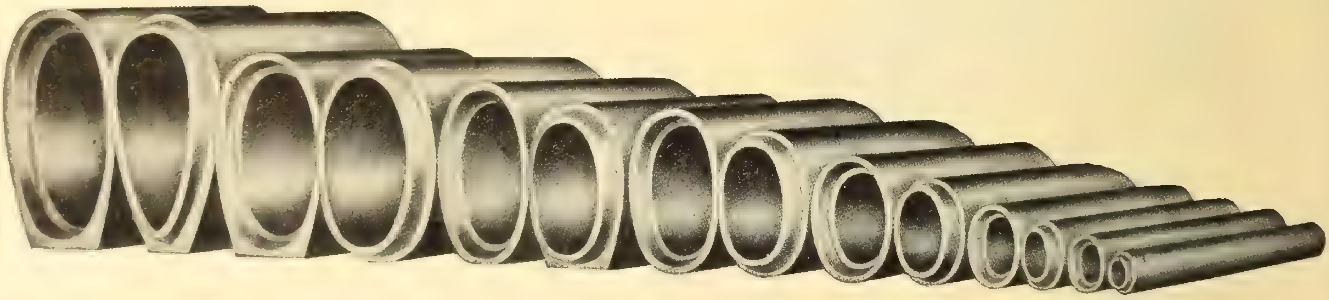

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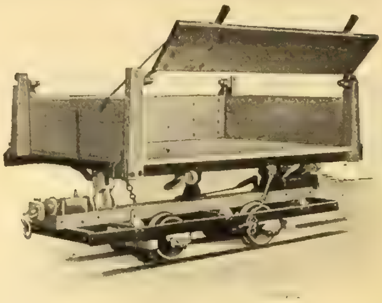

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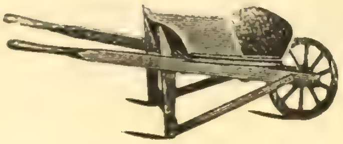

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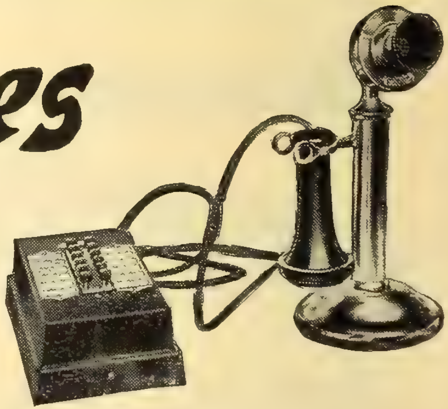

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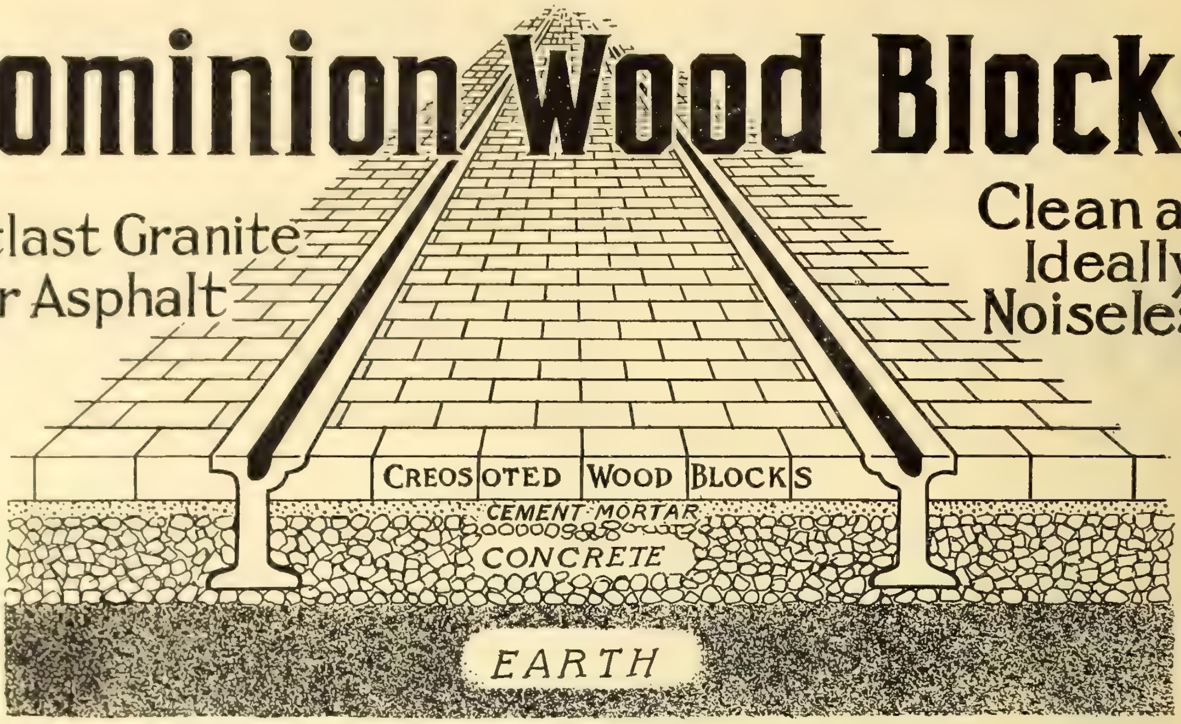

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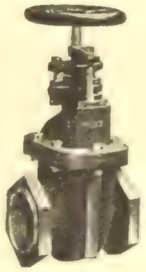

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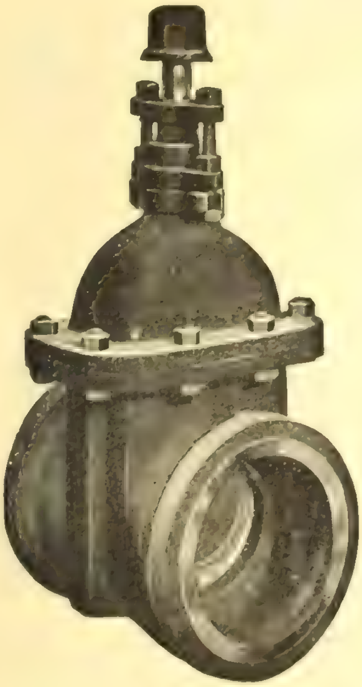

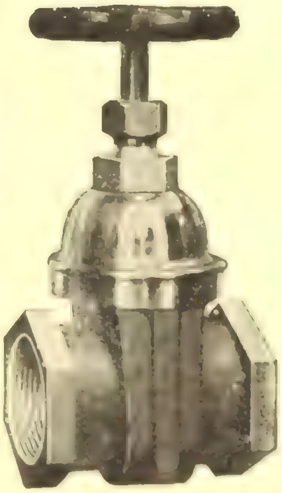

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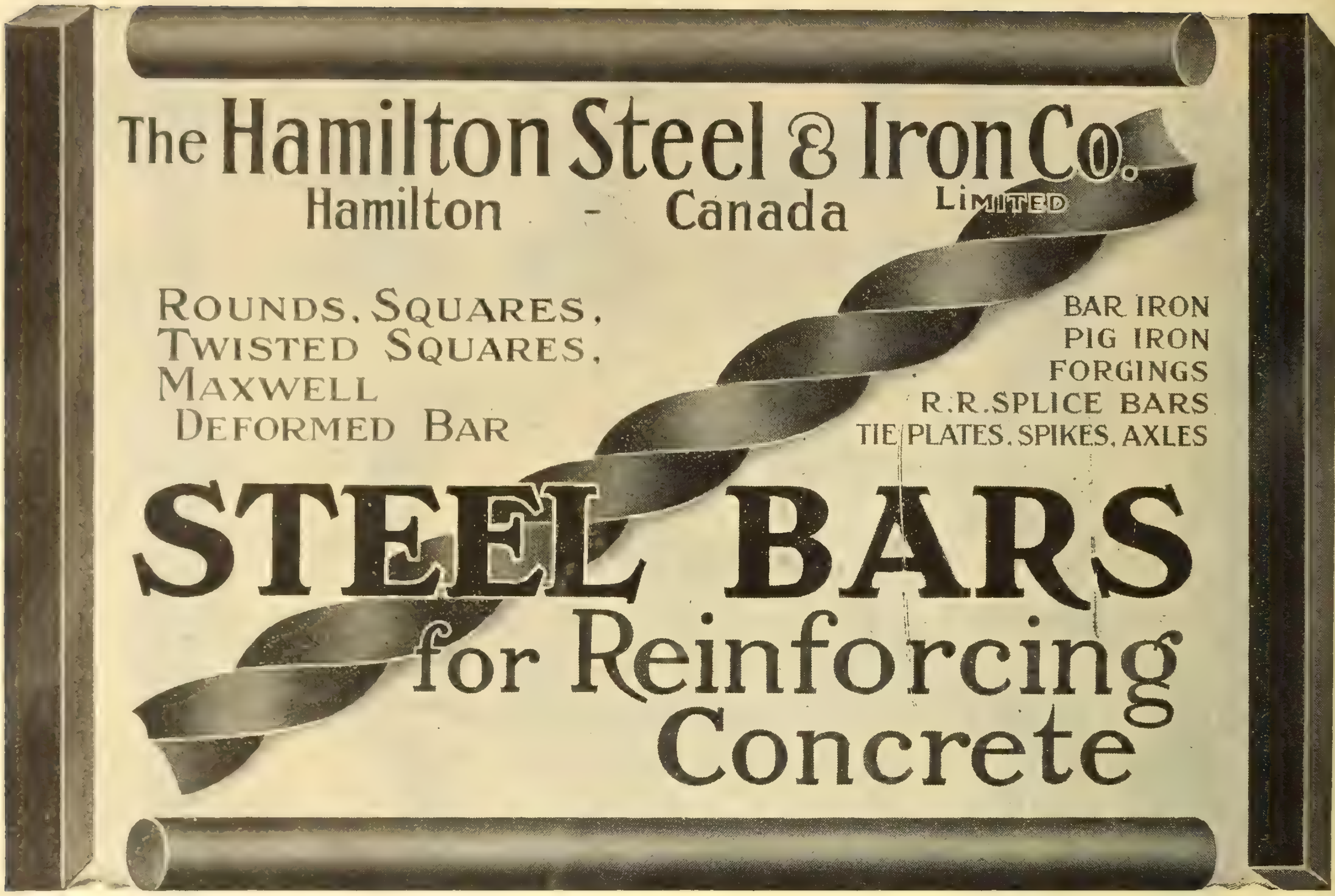
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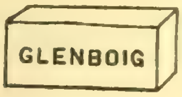

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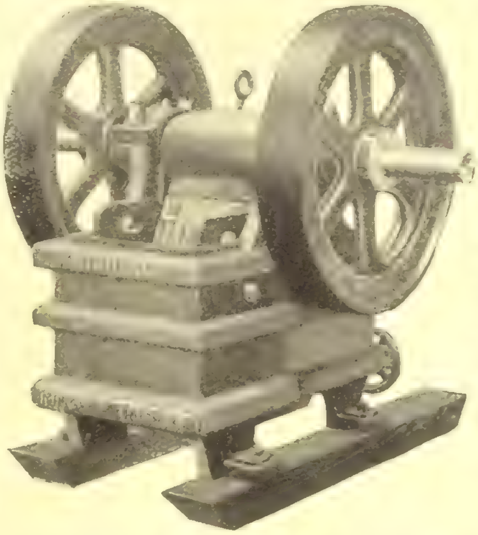

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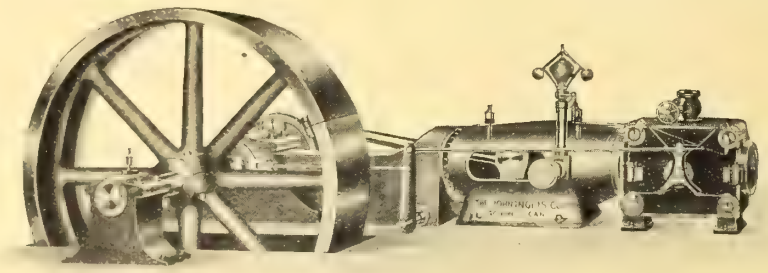

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Edmonton, Alta.

Estimates of the Engineering Department will provide for the construction of the Rat Creek trunk sewer, which it was decided to construct last year, but upon which suspension of plans was made pending the report of Alex Potter. C.E., on the sewerage and water systems of the city. The sewer will be 10 feet in diameter, of reinforced concrete, and will be some 3,600 feet in length. It will form the first portion of a general plan of sewers for Edmonton.

Montreal, Que.

Tenders addressed to the Board of Commissioners will be received until January 20th for construction of a 2' x 3' sewer in Boulevard avenue from Decarie avenue via St. Luke Road, to the limits of Westmount. Plans, etc., in office of the Superintendent of Sewers L. N. Senecal, secretary.

Niagara-on-the-Lake, Ont.

Plans for a system of experimental roads between Bridgeburg and Niagara-on-the-Lake are being prepared by Cr. W. A. McLean, Provincial Good Roads and Highways Engineer. The work, which is being paid for by the Niagara Falls Park Commision, is designed to show just what results can be secured from the various methods of road construction known to the engineers of the Public Works Department.

Ottawa, Ont.

Mayor Hopewell in his opening address recommended ni the near future the purchase of a water power for the municipal light and power plant.

A bill will come up before the Ontario Legislature to give the city permission to raise $300,000 with which to construct six miles of sewer to drain the western section of the city. It wil run from a 12-inch circular concrete sewer. A septic tank will also be required.

The municipal campaign emphasised the desirability of extending the sewer system very much in the western portion of the city this summer and provision will be made to do even more there this summer than last. The question of draining the lands around Dowe's lake is also under serious consideration. At present the sewer mains are not low enough to take away this water.

Regina, Sask.

The city has decided upon the overhauling of the present system of water supply.

Sault au Recollet, Que.

At a meeting of the council the question of borrowing $140,000, through raising the borrowing power from twenty to forty per cent., will be further considered and action taken. The proceeds to bt used for the instalation of a modern water system and sewers.

Toronto, Ont.

The City Engineer asked for an interim appropriation of $50,200 for the Water Works Department and $87,800 for the Works Department. The Board of Control was asked to confirm these appropriations and to provide the funds in advance of the estimates for the current year.

It is reported that a commission of three will be appointed to spend the $300,000 voted by the city, York County and the Provincial Government for good roads leading into the city, each body to have one representative. The commission will prepare plans, not only for the construction of the roads, but for their maintenance after construction.

Vancouver, B.C.

The ratepayers have authorized the issue of debentures for the following.—Street improvements, $425,000; waterworks extensions, $400,000.

Winnipeg, Man.

The City Engineer has submitted estimates of the cost of operating three softening plants which would have a total capacity of 13,000,000 gallons daily. He estimated that the cost would be about twenty-three cents per thousand gallons. It was recommended that the old plant be used to soften the water from wells 2, 3 and 4, and the new plants be secured for wells 5 and 7. The committee laid the proposition over to a later meeting.

AWARDED

North Vancouver, B.C.

MacDonald Czonski & Co. secured the contract separately and in bulk for initial sewer installation. The total amount of the contract is $206,000.

Point Grey, B.C.

The Council awarded a contract for laying a 12-inch water main on Bodwell road from Heather street to the site of the new reservoir near Granville street to the Power Contracting Company. Tenders were received. The contract includes all work in connection with digging the trenches and hauling and laying the pipe. Mess JL Cameron are the engineers in charge.

Winnipeg, Man.

The contract for water mains was awarded to the Enginer of Construction, $1,675

Railroads, Bridges and Wharves

Edmonton, Alta.

On January 27th the ratepayers will vote on a by-law to raise $164,000 for the construction of a bridge over the Northern Saskatchewan River, in the northern end of the city.

Kingston, Ont.

The directors of the Ontario Exploration Syndicate with iron mines at Wilbur, have applied to council with regard to their request for land for shipping and smelting purposes and the deepening of the lower harbor and widening of the Cataraqui draw bridge. They are anxious to proceed with the erection of a large pier.

Montreal, Que.

The C. P. R. have ordered sixty steel cars of fifty tons capacity specially designed for the transportation of pitch.
add railroads CMy

Michipicoten River, Ont.

Tenders are being called until February 13th by the Public Works Department, Ottawa, for the construction of a wharf at the mouth of the Michipicoten river, West Algoma. Plans, etc., at above Department and at the office of J. G. Sing., Esq., District Engineer, Confederation Life Building, Toronto, Ont.; E. B. Temple, Esq., District Engineer, Port Arthur, Ont., and on application to the local Postmaster, R. C. Desrochers, secretary.

Ottawa, Ont.

Tenders will be received until January 30th, 1911, for the construction of a breakwater at Brooklyn, Queen's County, N.S. R. C. Desroches, Secretary, Pepartment of Public Works, Ottawa.

Calgary, Alta.

The timbering part of the cement pier work for the G. T. R. bridge at Lignite is well under way; also the steel work. The bridge is well over a quarter of a mile long and is 125 feet above the water.

Peterboro, Ont.

George S. Deeks, of Toronto, who has the contract for building the line from Coldwater to Bethany, just outside of Peterboro, a distance of about 80 miles, states that he is now busy letting subcontract, with a view to putting workmen on the whole route as early as possible in the spring. About 17 miles of the road have already been completed.

Peticodiac, N.B.

Measurements and elevations for a new bridge over the Babcock stream have been taken. This bridge will be built as a permanent structure on concrete abutments, and will be covered. Tenders will probably be asked for in the spring. Mr. McVey, Public Works Engineer; Structural Superintendent, J. T. Forbes, Moncton.

Quebec, Que.

It was announced in the Quebec Legislature last week by Mr. Taschereau that in ten years the wooden bridges would all have disappeared from the province and been replaced by iron ones.

United States bridge experts will probably be chosen to settle the difficulties concerning the Quebec bridge. The disagreement is caused by the inability of the commissioners to agree as to whether the tenders submitted on the original plans must be adhered to or whether the tender of the Dominion Bridge Company drawn up on their own plan is admissable.

Tenders for the new bridge across the St. Charles river were received as follows: Eastern Steel & Iron Works, J. H. Gignac, Phoenix Bridge Co., McGuegan Construction Works (Montreal), J. Lemoine & Fils, and Jos. Gosselin, and were referred to Mr. L. A. Vallee for a report upon the most advantageous of the offers, as several of the tenders included figures for a swing bridge as well as a draw bridge.

Vancouver, B.C.

The ratepayers approved of the issue of debentures for aid to Second Narrows bridge, $115,000; but defeated the projects for the two bridges contemplated to connect the central section of the city with other districts.

AWARDED

Ottawa, Ont.

The Public Works Department recently awarded the following contracts: Duncan's Cove, Halifax Co., N.S., breakwater, A. W. Giroir and Kingsman Sweet, contractors, $6,960; Three Fathoms Harbor, Halifax Co., breakwater, Obed A. Ham, contractor, $7,848; Ottawa St. Joseph LaLtellier, Que., wharf, N. Warren, contractor, $18,900.

Public Buildings, Churches Schools, etc.

Anitgonish, N.S.

A proposal is under consideration for the extension of St. Francois Xavier College.

A new wing will be added to St. Martha's College Hospital. Work will commence early in the spring.

It is also understood that during the coming year a new wing, capable of accomomdating sixty residential lady students, will be added to Mount St. Bernard's Convent.

Atkinson, Ont.

Tenders will be received until January 20th, 1911, for the erection of the new Sand Hill Presbyterian Church, Township of Pittsburgh. Rev. H. W. Reede, M.A., St. John's Manse, Kilbirnie, Ont.; Henry Johnston, jr., Atkinson, Ont.

Battleford, Sask.

Tenders are being called until January 30th by the Department of Public Works, Ottawa, for Post Office, Customs and Inland Revenue Fittings. Plans, etc., on application to W. R. Latimer, local clerk of works and at above Department. R. C. Resrochers, secretary.

Brandon, Man.

T. Sinclair, architect, has been gathering information as to the different cold storage plants throughout the Dominion and has prepared rough plans for the proposed local structure.

through the Canadian Incorporated Sub-

Plans for the new hospital for the insane will be completed shortly and tenders called for within a few weeks. The proposed structure will be 372 feet long and 150 feet deep, of brick and stone construction. Electric elevators will be installed.

S. Hooper, Provincial Architect, Winnipeg, writes that plans are being prepared for the new Asylum and power house for same, new addition to Land Titles Building; also for the new Agricultural College and addition to main Telephone Exchange, Winnipeg.

Brantford, Ont.

At a meeting of the governors of the John H. Stratford Hospital last week, Architect Green, of Buffalo, submitted plans for remodelling the building. Mr. Green recommended partial completion at an estimated cost of about $65,000. It is posible, however, that the structure will be demolished and a new building erected at a cost of $100,000.

Brockville, Ont

It is stated that the General Hospital Board of Governors have had an offer from Mr. Chas. W. MacLean to erect an addition to the south wing of the hospital as a memorial to his wife. Chas. E. Cossitt, president.

Edmonton, Alta.

The Dominion Government has made a grant of $50,000 for a Military Drill Hall for Edmonton, also $10,000 for a wharf.

It is reported The Masonic Temple Ltd., purpose erecting a five or six story block on the corner of 6th street and Jasper avenue this spring.

On January 27th the ratepayers will vote on a by-law to raise $175,000 by debentures for improving the Exhibition Park and erecting additional buildings thereon.

Commissioner Turner, of the School Board, is preparing plans for the McCauley School to be erected this spring between McCauley and Heiminick streets at a cost of about $100,000.

According to the estimates which have been placed before the Provincial Legislature $515,000 will be expended towards the completion of the new Parliament buildings; $140,000 will be expended to complete the new Court House, and $50,000 is granted for a site and building for a new Land Titles Bldg.

Fort Steele, B.C.

The Church of England are considering the erection of a new church this year.

Fort William, Ont.

Geo. H. Wiliamson, general secretary, Y. M. C. A., invites competitive plans for a new Y. M. C. A. building. Conditions and full information upon request.

Guelph, Ont.

A number of small modern buildings, cost of all about $80,000, will be erected by the Guelph Sanitarium to replace the structure recently destroyed by fire.

Lachine, Que.

Plans are being prepared for a large club house. Mr. P. Magor, of Lachine, is interested. Estimated cost, $100,000.

Lindsay, Ont.

Tenders addressed to R. C. Desdochers, Secretary, Department of Public Works, Ottawa, will be received until January 30th for interior fittings at the post office. Plans and specifications to be seen on application to Mr. W. Healey, caretaker, Public Building, Lindsay, Ont., Mr. T. A. Hastings, Clerk of Works, Postal Station "F," Toronto, and at the Department of Public Works, Ottawa.

London, Ont.

A special committe of the County Council is considering the extension of the court house at a cost estimated from $6,000 ot $10,000.

The City Council are considering the the appointment of a special committee to arrange for the erection of a new city hall. City Architect Nutter will prepare preliminary sketches. The site of the proposed new building is at present under consideration. Probable expenditure, $125,000 to $150,000.

Macleod, Alta.

Among the town projects in the coming season are a new $35,000 hospital; a new $10,000 Government Post Office building; a new $40,000 municipal building containing fire and police accommodation, and the town hall.

Medicine Hat, Alta.

St. Patrick's Roman Catholic congregation has purchased half a block of land on which to erect a new edifice in the spring.

Montreal, Que.

A meeting of the members of the Engineers' Club has been called for the 18th inst., for the ratification of the proposed additions and alterations to the present building. The sum of $92,500 is to be spent and Messrs. Saxe and Archibald, architects, Beaver Hall Hill, have prepared preliminary plans.

Ottawa, Ont.

A deputation will wait on the Premier and Minister of Militia at as early a date as possible to urge that a new drill hall be erected in this city.

Recent Government estimates passed include $19,000 for a Post Office in Maisoneuve, P.Q., $15,000 for one in Marieville, P.Q., and $5,000 for improvements of the Post Office at Aylmer, P.Q.

The foundation for new Bethany Presbyterian Church is almost completed and it is stated work will begin in the spring. J. A. Ewart, architect. Noted previously.

It is semi-officially announced that plans will be made at an early date to demolish the present printing bureau and to erect a more modern structure in another part of the capital. The present site, which is near Neapean Point, will be converted into a park by the improvement commission.

The plans are out for a new machinery hall in connection with the Central Canada Exhibition. It will be 280 feet long, and 140 feet wide and of Japanese architecture. It will have a steel frame with brick on the outside and the roof will be of red tile. The pillars, etc., will be of concrete. W. E. Noffke prepared the plans and it is expected that tenders will be called for it in the spring.

Prince Albert, Sask.

The ratepayers authorized the expenditure of $8,500 on high school addition.

Quebec, Que.

P. E. Ryan, Secretary of the Commissioners of the Transcontinental Railway, invites tenders until January 23rd for the demolition of Champlain Market. Specifications, etc., may be obtained on application to A. E. Doucet, district engineer.

Regina, Sask.

Fourteen school districts of the province have been authorized to expend $15,000 in all for the erection of new buildings. Details are as follows:—

Daybreak school district, Maple Conlee, $1,500 for the purpose of erecting and furnishing a school house and building a stable.

Hayfield school district, Central Butte, $1,500 to erect and furnish a school house.

Springside school district, Springside, $600 for the erection of a teacher's residence.

Stuckle school district, Lenora Lake, $1,100 to erect a school house.

Meadowbrook school district, $1,500 for the purpose of erecting and furnishing a school house.

Pillar school district, Neudorf, $1,000 to erect a new school house.

Plans have been prepared for the erection of the new Baptist Church at the corner of Victoria avenue and Lorne street. Estimated cost, $75,000.

Saskatoon, Sask.

The Third Avenue Methodist Church has disposed of its present site and will erect a new building farther out from the business section.

The R. C. Order has purchased a site of 10 acres near the end of the city and will erect a large boarding school or convent thereon. Rev. F. Vachon is interested.

South Middleton, Ont.

Tenders for reconstruction of school house, S.S. No. 7, township of Middleton, addressed to Geo. Fisher, secretary-treasurer, will be received until March 15th. Plans, etc., at office of above.

Toronto, Ont.

Tenders addressed to R. C. Desrochers, Secretary, Department of Public Works, Ottawa, wil be received until January 30th for interior fittings, postal station B.

Plans and specifications to be seen on application to M. T. A. Hastings, Clerk of Works, Postal Station "F," Toronto, and at the Department of Public Works, Ottawa.

Tenders addressed to Darling & Pearson(architects, 2 Leader Lane, will be received until January 28th for all trades in the erection of a power house for the General Hospital. Plans and specifications upon application.

At a meeting of the Weston Presbyterian Church last week plans were approved for the construction of a new school building. Dr. Meldrum may be addressed.

Vancouver, B.C.

This municipality has authorized the issue of debentures for public improvements totalling $2,525,000, and voted down proposed expenditures totalling $946,000. The objects approved are as follows: Schools, $967,000; hospitals and lands, $286,500; Exhibition Purposes Association, $115,000.

Wainwright, Alta.

A new town hall is being considered by this municipality.

Winnipeg, Man.

Architect Wm. Bruce has submitted to the Board of Control amended plans for the public bath to be constructed in Selkirk park. Plans were submitted some time ago which called for the expenditure of $75,000, which was $25,000 in excess of the appropriation, and the board refused to consider them. The amended plans have been referred to the chairman of the public library and baths committee.

Woodstock, N.B.

The school trustees have approved plans for a new building submitted by G. E. Fairweather, architect, this city. The building will contain six class rooms and will cost approximately $60,000.

AWARDED

Ottawa, Ont.

It was decided to have the alterations at Howick Hall done by day labor under the supervision of the City Engineer at a cost not to exceed $1,600. The association reported that three tenders were received but one came in too late. The other tenders were A. Slack, $1,761; Smith Bros., $1,527.

Among the recent contracts awarded by the Public Works Department are St. Henri, Que., addition and alteration of Post Office, contractor, Joseph Jacob & Co., $4,890; Toronto Central Post Office, E. P. McGrath & Co., contractors, Ottawa, $12,125; militia stores, fittings and racks, E. P. McGrath & Co., contractors, $3,875.

St. John, N.B.

Mr. Michael Sullivan, of Kingston, the well known contractor, has been awarded the contract to build the armory at St. John, N.B. It is estimated the building when completed will cost about $250,000.

Residences

Strathcona, Alta.

Mr. W. J. McNamara, of Wetaskiwin, has purchased property here on Eighth avenue, on which it is stated he will erect this year a residence costing about $20,000.

Vancouver, B.C.

A building permit was granted for the erection of a three-storey apartment house for Dr. William Moody at 1672 Georgia street.

AWARDED

Montreal, Que.

Mr. W. H. Creed, builder, Roslyn avenue, Westmount, is erecting two apartment houses on Cote des Neiges Road near Westmount Boulevard. Cost $90,00.

The contract for the plumbing and heating of a residence for Mr. A. T. Lane, Bellingham Road, Outremont, has been awarded to John A. Gordon, 301 St. Antoine Street. Architects, Hutchison, Wood & Miller, Royal Ins. Building.

Business Buildings and Industrial Plants

Chatham, Ont.

Mr. R. O'Hara will erect a fine residence on Forest street.

The Western Bridge and Equipment Company will erect a larger building than at first contemplated.

Edmonton, Alta.

Building permit was issued to A. W. Ormsby, store, Fifth street, $2,500.

R. Tegler will erect a six-storey building on the southeast corner of First and Elizabeth streets, 50 x 150 feet, at a cost of about $100,000.

Crafts, Lee & Gallanger propose erecting a four or five story block on the northwest corner of First and Peace avenue, 100 x 150 feet.

Architect H. A. Magoon is preparing plans for a five-storey hotel to be built by J. B. Mercer, on present site Grand Central Hotel. Cost about $100,000.

It is reported an Edmonton Syndicate has purchased 50 feet of property adjoining the Journal office, First street, at $35,000, for the erection of a 10-storey block.

Messrs. MacDougall & Secord contemplate the erection of a ten-storey business block on the corner of First and Jasper streets. The date of construction has not ben decided upon.

Lethbridge, Alta.

The Balmoral Hotel was burned on the [illegible] F. W. Downey, part owner.

Maisonneuve, Que.

The Shawinigan Company has purchased a block of land comprising 235 vacant lots fronting on Charlemagne street, Maisonneuve, for the sum of $75,000. Although no information can be officially gained as to the company's intentions, it is understood that considerable extensions are to be made to their Montreal terminal station.

Medicine Hat, Alta.

The Alberta Linseed Oil Company, capitalized at $500,000, will erect a large refining plan here.

W. Poper Hull, a Calgary capitalist, has purchased 125 feet frontage on Toronto street on which he will erect a four-storey block in the spring.

Midland, Ont.

The Campbell Milling Company, Toronto, it is announced, will erect a flour mill here; capacity, 1,000 barrels daily. Work will start in the spring.

Montreal, Que.

It is stated that the Montreal Terra Cotta Co. will locate at Pointe Claire, P.Q., and will erect a new plant and kilns there.

Sets of plans and specifications for certain works for Messrs. Workmans and others are to be displayed in the Builders' Exchange, Montreal, by Mr. Harry Jones, architect.

Nelson, B.C.

Among the plans for extension by the British Columbia Telephone Company is that for the erection of a new exchange building here. Estimated cost, $10,000. Other exchanges are reported for Kamloops, Alberni and Duncans.

Ottawa, Ont.

T. D. McFarlane will build two stores on Bank street in the spring.

R. Mulhall & Co. will probably erect a large storehouse near the Union Station in the spring.

A. LeB. Weeks, architect, is calling for tenders for a residence for W. M. Southam to be erected at Rockliffe. It will be of brick.

Ex-Ald. T. Clarey will make extensive changes to a property he recently purchased, corner Maclaren and Bank. It was partially destroyed by fire.

Parkhill, Ont.

The Hastings Hotel was damaged by fire on the 9th inst. to the extent of about $15,000.

Quebec, Que.

The stores of Glover, Fry & Co. were destroyed by fire on the 11th inst. Estimated loss, $125,000.

Regina, Sask.

The Imperial Bank of Canada, it is stated, will erect a large block at the corner of Scarth street and Elworth avenue.

A six-storey fireproof office building will be erected by English capitalists on Eleventh avenue in the spring. The name of the company which will erect the building and the exact location are withheld for the present, but the plans are under preparation by M. W. Sharon, architect. The first two stories will be constructed of cut Bedford stone, and the balance of the building of buff terra cotta. Cost, $200,000.

The Western Manufacturing Company, Limited, are their own architects for additions and alterations to their plant here and at Moose Jaw. The additions at Moose Jaw will be of brick and reinforced concrete, of one-storey, 28 x 42. Estimated cost, $2,500; cost of equipment [illegible]. The estimated cost of the [illegible] power [illegible] here [illegible] of equipment, [illegible]. Plans and specifications for the latter were sup-

(Continued on page 38)

Tenders and For Sale Department

ROCK CRUSHERS

We have a No. 4 and a No. 5 McCully gyra[illegible] with manganese steel head and con[illegible] for breaking very hard material [illegible] new, never set up. Located New York State. Also a 60-ft. elevator and a 48-in. x 12 [illegible] screen. Will sell separately. Attractively priced. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

Tenders

Toronto General Hospital

Tenders addressed to the Chairman of the [illegible] Committee will be received by the undersigned up till noon, Saturday, January 28th, 1911, for all the various trades required in the erection and completion of a Power House in connection with the General Hospital.

Plans and specifications and all other information can be obtained at the office of the Architects, DARLING AND PEARSON, 2 Leader Lane.

The lowest or any other tender not necessarily accepted. 3-3

Toronto Main Drainage

Sealed Tenders addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, endorsed "Tender for Section No. 1, Low Level Interceptor," or "Tender for Laying Reinforced Concrete Over-flow Pipe from Sewage Tanks," etc., as the case may be, for the construction of the several sections of Low Level Interceptor and other works, as mentioned below, will be received by registered post only, until noon of TUESDAY, FEBRUARY 7TH, 1911.

The following is an approximate description of the various works:—

1. Low Level Interceptor, Section No 1, Egg shape, 2 ft. 10 in. x 4 ft. 3 in. 4,566 linear feet.
2. Low Level Interceptor, Section No. 2, Egg shape, 3 ft. 2 in. x 4 ft. 9 in., 2,475 linear feet.
3. Low Level Interceptor, Section No. 3, Egg shape, 3 ft. 6 in. x 5 ft. 3 in., 2,295 linear feet; Circular, 4 ft. 6 in. diameter, 1,023 linear feet. (Total length Section No. 3, 3,318 linear feet).
4. Laying reinforced concrete overflow pipe from sewage tanks, 292 linear feet of 60-inch circular pipe in lengths of about 24 feet.
5. Cast Iron Penstocks for Low Level Interceptor.

Tenderers shall submit with their tender the names of two personal sureties approved by the City Treasurer, or in lieu of said personal sureties the bond of a Guarantee Company, approved [illegible].

Specifications may be obtained from, and original drawings will be on file and can be seen at the Main Drainage Department, City Engineer's Office, on and after January 9th, 1911.

For the convenience of Contractors, sets of blue prints have been prepared and will be issued to contractors, upon application to the City Engineer and upon receipt of deposits as follows: For items 1, 2 and 3 combined, $5.00; for item 4, $2.00, and for item 5, $2.00. Deposits should be made by cheque payable to the City Treasurer. The deposits will be refunded upon return of blue prints in good condition within thirty days of receiving tenders.

The usual conditions relating to tenders as prescribed by City By-law must be strictly complied with or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.

City Hall, Toronto,
January 3rd, 1911. 2-4

SEALED TENDERS addressed to the undersigned, and endorsed "Tender for Interior, Fittings, Postal Station B, Toronto," will be received until 4.00 p.m., on **Monday, January 30th, 1911**, for the work mentioned.

Tenders will not be considered unless made upon, and in accordance with conditions contained in forms furnished by Department.

Plans and specifications to be seen on application to Mr. T. A. Hastings, Clerk of Works, Postal Station "F," Toronto, and at the Department of Public Works, Ottawa.

Each tender must be accompanied by an accepted cheque on a chartered bank, payable to the order of the Honourable the Minister of Public Works, equal to ten per cent. (10 p.c.) of the amount of the tender.

By order,
R. C. DESROCHERS,
Secretary,

Department of Public Works,
Ottawa, January 12, 1911. 3-3

Plaster Manufacturing Plant for Sale by Tender

Tenders will be received by the undersigned up to noon on **Monday, 6th February, 1911**, for the purchase of the assets of The Imperial Plaster Company, Limited, Toronto and Cayuga as follows:—

Parcel 1.—Toronto Assets.		
Buildings, Plant and Machinery	$8,616.55	
Stock in trade and Chattels	2,714.79	$11,331.34
Parcel 2.—Cayuga Assets.		
Mine and Buildings	$6,750.00	
Plant and Equipment ...	4,413.83	
Rock, mined and crushed..	627.45	$11,791.28
		$23,122.62

Intending purchasers may tender for the above mentioned assets en bloc or for either or both of the parcels separately.

Each tender must be accompanied by a certified cheque, payable to the Assignee, for ten per cent. of the amount of such tended. Information as to terms, etc., may be had and inventories seen at the office of the undersigned.

J. P. LANGLEY, Assignee,
McKinnon Building, Toronto, Canada.

Positions Vacant

Advertisements under this heading two cents a word per insertion

WANTED IMMEDIATELY.—Competent architectural draftsman. Must be first-class on design, working drawings, details, and perspectives rendered in colors, and be capable of taking charge of office in western city. State salary expected; send samples of work. Only first-class men need apply. Address Box 187 "Contract Record," Toronto. 2-3

Positions Wanted

dvertisements under this heading one cent a word per insertion. Box No ten cents extra

WANTED—Position as superintendent or general foreman, railroad work preferred. Twenty years experienced. Address, Box 189, Contract Record, Toronto, Ont. 3-4

ALL ROUND ARCHITECTURAL DRAFTSMAN.—14 years' experience, capable of handling large projects as well as ordinary commissions, managing an office and interviewing clients. Four years' private practice. At liberty May 1st. Vancouver, Victoria or other Pacific coast cities preferred. Address LOUIS R. CHRISTIE, 2542 North Spaulding Avenue, Chicago, Ill. 2-3

City of Winnipeg

Tenders for

Pumping Machinery

Sealed tenders addressed to the Chairman, Board of Control, Winnipeg, Canada, will be received at the office of the undersigned up to 11 a.m., on MONDAY, FEBRUARY 6TH, 1911, for the manufacture, delivery and erection complete of Two Pumping Plants each of a capacity of one million imperial gallons per 24 hours. Specifications and forms of tender, together with conditions governing tenders as prescribed by by-law, may be obtained at the office of the City Engineer, 223 James Avenue, Winnipeg. The city reserves the right to reject any or all tenders, or to accept any bid which appears advantageous to the city's interest.

M. PETERSON,
Secretary.

Board of Control Office,
Winnipeg, Jan. 6th, 1911. 2-3

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

REPRESENTATIVES WANTED — Reliable firm manufacturing complete line of electrical measuring instruments want responsible representatives to handle their lines throughout the whole of Canada. Are prepared to deal separately for Eastern and Western Canada. Box 194 Contract Record, Toronto, Ont. 3-5

Business Buildings and Industrial Plants

(Continued from page 35)

plied by O. E. Tench, architect, Newmarket, Ont. T. A. Wilson, manager. Equipment has been supplied.

Stony Plain, Alta.

One section of the town on Main street from Railway avenue to Second avenue, was destroyed by fire on the 9th inst.

Three Rivers, Que.

Plans are being prepared by Messrs. Pringle & Co., Coristine Building, Montreal, for the buildings in connection with the Wayacamite pulp and paper mills. Although the prospective cost of these buildings cannot be ascertained, it is understood that it will be in the neighborhood of $100,000.

Tofield, Alta.

A business block at Ryley, east of here, was destroyed by fire. Estimated loss, $20,000. The principal losers were Wick, Burgar, J. L. Hay and others.

Toronto, Ont.

Mr. P. J. Mulqueen, it is stated, will erect a hotel on Yonge street north of the Tremont House on the expiration of the present lease in April, 1912.

Vancouver, B.C.

The Western Steel Corporation are stated to have purchased 300 acres on the south side of the Fraser river through the Canadian Incorporated Subsidiary Company. About $2,000,000 will be expended on construction of buildings and wharves and installation of machinery. Among the Vancouver men interested are Messrs. R. P. McLennan, G. M. Gibbs, and S. G. Faulkner, direct- the American Company, of Irondale, Wash., has approved of the site. Noted previously.

Welland, Ont.

Mr. Burgar has been authorized by the Niagara Falls, Welland and Dunnville Electric Railway to secure sites for their depot, it is stated.

The Canadian Automatic Transportation Company, with head office at Toronto, a branch of the Automatic Transportation Company, of Buffalo, it is reported, will erect its Canadian plant here, having purchased a site of three acres adjoining the Ontario Iron and Steel Company. Building operations will begin at once.

Winnipeg, Man.

The Kelly Block was destroyed by fire on the 14th inst. Total loss, about $400,000.

The Allan Line Steamship Company has purchased 30 feet on the west side of Main street imediately north of Alloway & Champion's new banking premises. It is the intention to tear down the old building and early in the spring the Alan Line will erect a handsome modern office building on the site.

AWARDED

Montreal, Que.

Messrs. National Steel Co. are erecting a large plant at Longue Pointe to cost one million dollars. General contract awarded to Messrs. Peter Lyall & Sons Limited, general contractors, Board of Trade Building.

The Queen's Hotel Co. are making an extension to their present premises at the corner of St. James and Windsor streets. The general contract has been awarded to Peter Lyall & Sons Limited, Board of Trade Building. Architects, Saxe & Archibald, 59 Beaver Hall Hill.

The contract for the ornamental iron works in connection with the new office building being erected for the Dominion Express Co., St. James Street, has been awarded to Messrs. John Watson & Son, Limited, 173 Wellington Street. Architects, E. & W. S. Maxwell. General Contractors, Peter Lyall & Sons, Limited.

Three Rivers, Que.

The contract for the -oo ton pulp machine for the Wayakamite Paper Co. has ben let to the Jeffrey Manufacturing Company.

Power Plants, Electricity and Telephones

Arnprior, Ont.

The by-law to authorize the pumping of water by electric power was carried. This power will be developed by a company on the Mississippi at Galetta.

Calgary, Alta.

It has been decided to build a passable road to the power site on the recomendation of City Engineer Child. This is considered the initial step in the development of water power on the Elbow river. The road is required to furnish thoroughfare along a trail which now entails the fording of the river thirteen times within six miles.

Ottawa, Ont.

There is a proposal on foot to build a large dam across the Rideau river at Hog's Back, at the outskirts of the city. It is claimed that there would be a 30-foot head available there for developing power. Engineers are now investigating the feasibility of developing this power.

The Morrisburg and Ottawa Electric Railway asked permission from Council to run electric cars over Main street and Hawthorne avenue, in Ottawa East; for an entrance into the city to the freight and passenger terminal station, which it is proposed to erect on the west side of Main street at the corner of Hawthorne avenue. The city was also asked to grade Main street before the tracks were laid.

Press reports state the establishment of an electric smelting plant at Chats Falls, on the Ottawa River. Active work preparatory to the erection of the plant will begin early in the spring. It is proposed to build an electric line from the falls to the mines.

Port Hope, Ont.

A by-law granting a 30-year franchise to the Seymour Electric Power Company was carried here.

Regina, Sask.

The tenders for overhead work in connection with the installation of the street railway system, have been received by the commissioners, and were considered. The tenders are very complicated, according to the commissioners, and will require considerable attention before an accurate comparison can be made of them. City Commissioner, McPherson.

Toronto, Ont.

The City Engineer was instructed to report on the desirability of putting cluster lights on residential and other streets as local improvements.

The recommendation of the City Engineer that the Toronto Railway Company be ordered to lay a double line of car tracks on Danforth avenue from Broadview to a point 200 feet east of Greenwoods avenue and to extend the service thereon, was endorsed, along with the recommendation that the track allowance be paved with brick block, placed on a concrete foundation, at an estimated cost of $66,000. It was further recommended that the company be ordered to lay tracks on Greenwoods Avenue from Gerrard Street on Danforth Avenue, and to extend the service thereon and that the track allowance be similarly paved at an estimated cost of $54,050.

Vancouver, B.C.

The British Columbia Hydraulic Power Co., Ltd., Vancouver, is making application under the Water Act for a water record of 500 cubic feet per second, to be taken from Nanaimo river and lakes at a dam 30 feet high, about 1,200 feet above Nanaimo falls, and raising the water level to a point 3,500 feet above the point of diversion.

Victoria, B.C.

The arrangement between the city and the British Columbia Electric Company, of a flat rate of one and seventy-five one thousandths cents per kilowat hour for electricity to be supplied by the company's Jordan river plant, is approved of by the company and notification to council. A. T. Goward, local manager.

Winnipeg, Man.

It is stated that Mackenzie & Mann will erect a subsidiary steam power house at the foot of Mills street. This with the present Assiniboine plant would [illegible] within the city limits should the appeal to Privy Council from the decision against the company furnishing power for domestic lighting from its Lac du Bonnet water power plant be dismissed this move will probably enable the company to comply with the city's demand.

AWARDED

Calgary, Alta.

Chapman & Walker, Toronto, Ont., have been awarded for the Calgary Municipal system the contract for the supply of one 1,500 h.p. 2300 v., 3-phase, 60 cycle, 400 r.p.m. synchronous motor, to be direct connected to a 1,000 k.w. d.c. 550-600 volt generator; also one 200 k.w. motor generator exciter set; also complete switchboard apparatus—motor generator and exciter set, manufactured by Dick, Kerr & Co., Ltd.; switchboard by Cowans, Ltd., Manchester, England.

Ottawa, Ont.

The lowest tender for ornamental electric light poles for the extension of the white way was that of Northern Electric Co., which was $6,750 for 150 poles the same as those already placed on Sparks street and that of the Canada Foundary Company for $6,950 for a shorter pole which is fluted and would be more attractive. The Municipal Electric Commission has recommended in favor of the latter.

Miscellaneous

Ottawa, Ont.

Tenders will be received until February 17th, 1911, for the supply of a marine boiler for fisheries protection cruiser "Curlew." G. J. Desbarats, Deputy Minister of Naval Service, Department of the Naval Service, Ottawa.

Toronto, Ont.

Recent building permits include:—Harris & Lee, 1 pair semi-detached two-storey brick dwellings on Conduit street, $4,800; S. R. Campbell, two-storey theatorium on Main street, $5,000; J. J. Farrell, 1 pair semi-detached 2½-storey brick dwellings 159-7 Campbell avenue, $4,600; Fletcher Mfg. Co., five-storey brick and steel addition to factory, Hayter street, $6,000; J. T. & H. Hutson, two-storey and attic brick dwelling, cor. Oriole road and Heath street, $5,000; Geo. Gander, 2½-storey brick dwelling, Gladstone avenue, $3,300; Ed. Elliott, 2 pair semi-detached 2-storey brick dwellings, on Concord avenue, $12,000; Caulfield, Burns & Gibson, Ltd., alterations to factory, Spadina avenue, $3,000; J. Castleman (in trust), three-storey brick store and dwelling and warehouse, S.E. cor. Elm and Elizabeth streets, $12,000; Weismiller & MacKenzie Bros., two-storey brick store and dwelling, corner Rideau and Macdonnell, $3,000; H. B. Reesor, 1 pair semi-detached two-storey brick dwellings on west side George street, $5,500; The Chemical Laboratories, galvanived iron testing room, 148 VanHorne street, $5,000; H. Jennings, 2½-storey brick dwelling on St. Clair avenue, [illegible]

Vancouver, B.C.

Building permits were issued as follows: T. N. Yates, 1572 Graveley street $6,000; W. J. Read, 1818 Cornwall street, $3,500; J. Coleman, 260 Eleventh avenue east, $4,000; W. H. Brown, Semlin and Barnard, three houses, $8,400.

Tenders are called until February 6th for purchase of the assets of The Imperial Plaster Company, Limited, Toronto and [illegible]. Advertisement in "Tenders and For Sale Department" of this issue.

Laying Wood Paving with Cement-Grout Cushion along Street Car Tracks

A difficulty which attends the use of wood block paving is that of adjusting and supporting it effectively at such breaks in the pavement as are caused by manholes, sewer inlets, street railway rails, etc. The greatest amount of trouble occurs at the rails, as they form a continuous break in the center of the street, where traffic is most congested. The manholes and inlets are scattered and are placed where they are subject only to an average amount of traffic. This matter has been investigated by Mr. H. G. Davis on behalf of the Chicago Street Improvement Association, and the following information is taken from a report on the investigation.

The trouble at the rails is due to the following causes: (1) vibration caused by the movements of cars, (2) leakage of water into the sand cushion by passing between the rail and the paving, (3) the heavy stress to which the paving is subjected due to concentration of traffic upon it. Under these conditions, where any block pavement (wood, brick or stone) is laid upon a sand cushion, a special treatment is needed to prevent the sand from being washed or jarred out of place, and a consequent settlement of the paving. This settlement, however slight, is disastrous to any pavement, and especially so for wood block paving. As soon as blocks settle the paving begins to get the pounding effects of heavily loaded vehicles and a rut is produced.

The vibration alone will tend to shift the sand, but when water gets into the sand the latter becomes extremely mobile and the movement is accentuated. The vibration has also a pumping effect upon the saturated sand, and may cause it to flow to the surface of the pavement. Should this saturated bed of sand become frozen, it is likely to heave to such an extent as to cause damage to the pavement. To reduce the jarring, the joint along the rail should be fitted as perfectly as possible, so that wheels of vehicles will not drop or climb in passing from the rail to the pavement.

The remedy for the shifting of the sand and consequent settlement of the paving is believed to be in the treatment of the sand cushion. About five years ago the South Park Commission (Chicago) began using wood block paving for intersections of parkways with streets having car tracks, and laid the blocks on a cushion of cement grout instead of sand. This paving has proved successful under heavy traffic. The plan suggested, therefore, is to use this sand-cement grout instead of sand for the cushion bed between the rails and for at not entirely new, and is included in the plans prepared least 12 inches outside the rails. This cushion will not be affected by water or vibration. This arrangement is some time ago for Chicago street railway track construction with brick pavement. In this case, however, the grout cushion is used only for a strip on each side of each rail.

It is recommended that a dry mixture of 1 part Portland cement to 3 parts sand should be made, and spread in the same way as the ordinary sand cushion. The blocks are laid upon this and tamped. Then the paving is flushed thoroughly, so that the water will pass through the joints and interstices and saturate the sand-cement base. It is best to keep traffic off the pavement for 24 or 48 hours, in order to give the grout time to set. It is said that this is not absolutely necessary, however, as even if the traffic is admitted immediately, the material will "cake" sufficiently to be superior to a sand cushion. The additional cost is said to be very slight. This grout cushion may be used with either wood, brick or stone block paving; it may be used also around manholes, etc., if desired.

Another difficulty experienced where wood block paving is laid between the rails is the development of transverse ruts or grooves at the tie-rods which hold the rails together. This is due to the wide joint, and it is suggested that where such rods are used the blocks should be chamfered so as to permit of making the usual close joint. This would cause a little trouble in laying the pavement, but not enough to add materially to the cost.

Notable Concrete Bridge

A long concrete girder bridge has recently been completed by the Southern Railway Co. for its two-track line across the French Broad River near Asheville, N.C., between which city and Craggy, N.C., a new alignment and construction has been in progress. The bridge is 733 ft. 10 in. long, and consists of a series of twenty-two 30 ft. spans, each span of three parallel reinforced concrete girders, all resting on a solid concrete pier extending, on a skew of 30° to the axis of the bridge, clear across its width. The three girders are spaced 13 ft. 4 in. c. to c., the outside two each 24 in. wide and 7 ft. 7 in. deep, and the middle girder 36 in. wide and 9 ft. 7 in. deep, both reinforced heavily. The roadway is carried on a solid concrete slab between these girders 24 in. deep in the middle and with large brackets reaching down to the supporting girders. The spans are divided into series of four, at each of which the piers are 4 ft. thick at the top, the intermediate piers being but 3 ft. thick. The foundations are carried down to solid rock. The girders are continuous for the entire length of the bridge, but on each pier, at the foot of the small brackets reaching up to the girders, a grooved expansion joint was made by placing along it two thicknesses of ordinary tar paper. Further expansion was provided by a 2 in. space at each end of the continuous girder. Design loads and stresses were: Loading, Cooper E-50 + 100% impact; tension in steel, 12,500 lbs. per sq. in.; compression in concrete 450 lbs. per sq. in. Work was completed in May, 1910. The approximate cost of the entire structure was $125,000.

Use of Sawdust Concrete

Sawdust concrete has been used in the new Public Library building at Springfield, Mass., as a base on which to lay the cork carpet covering the floor. The object of the sawdust concrete was to obtain a layer into which nails could be driven and which at the same time would hold the nails. The company that laid it states that it accomplished both these purposes. If it had not been used it would have been necessary to lay the usual wooden floor, on sleepers and a cinder fill, between the structural slab and the cork carpet. The mix originally specified was 1:2:2, one part cement, two parts sand and two parts sawdust; but before applying it the contractors decided to experiment with various proportions. It was found that the 1:2:2 mixture would not set and after a couple of weeks could almost be blown away by the wind. Further experiments led to the conclusion that a 1:2:¾ mix, three-fourths of a part of sawdust, would give proper results and 5,000 sq. ft. of this mixture were laid. The thickness of the layer was 1 in. and after four months of service indications are that the material is successful. No cracks developed, even in strips as long as 125 and 150 ft., except at the joints at the end of a day's work. At some of these points cracks opened to a width of ¼ in.

Contractors and Builders Supplies

Crushed Stone

For Concrete Fireproof Construction, Roadwork and Sidewalks

Rubble, Portland Cement

CRUSHED GRANITE for Floors and Sidewalks
SEWER PIPE WEEPING TILE
FIRE BRICK FIRE CLAY

Crescent Fire Brick

We are exclusive Distributing Agents for this high grade, hand-made fire brick. Large stock always on hand.

Don't forget our Prompt Delivery Service.

The Rogers Supply Co. - Toronto

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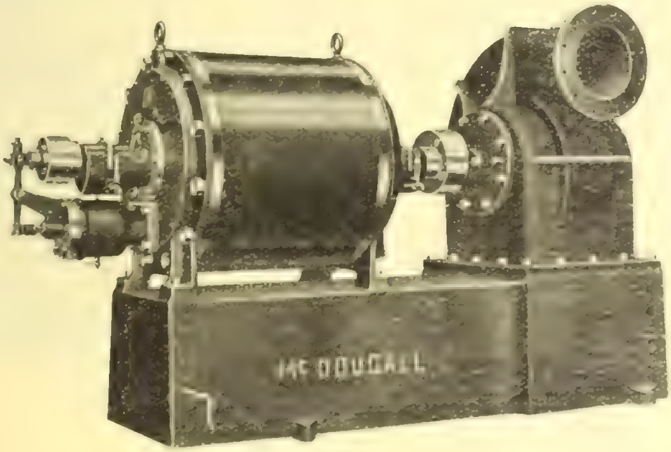
WORTHINGTON CENTRIFUGAL PUMPS



THE VOLUTE PUMP, HERE SHOWN, IS SPECIALLY DESIGNED TO FEED A HOT WATER HEATING SYSTEM. IT HAS A CAPACITY OF 2150 IMPERIAL GALLONS PER MINUTE, AND IS DRIVEN BY A 75 H. P. STEAM TURBINE.

OUR NEW BULLETIN NO. 106, SHOWING MANY APPLICATIONS OF THESE PUMPS, WILL BE SENT ON APPLICATION TO OUR SALES OFFICES.

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CALEDONIAN IRON WORKS CO.
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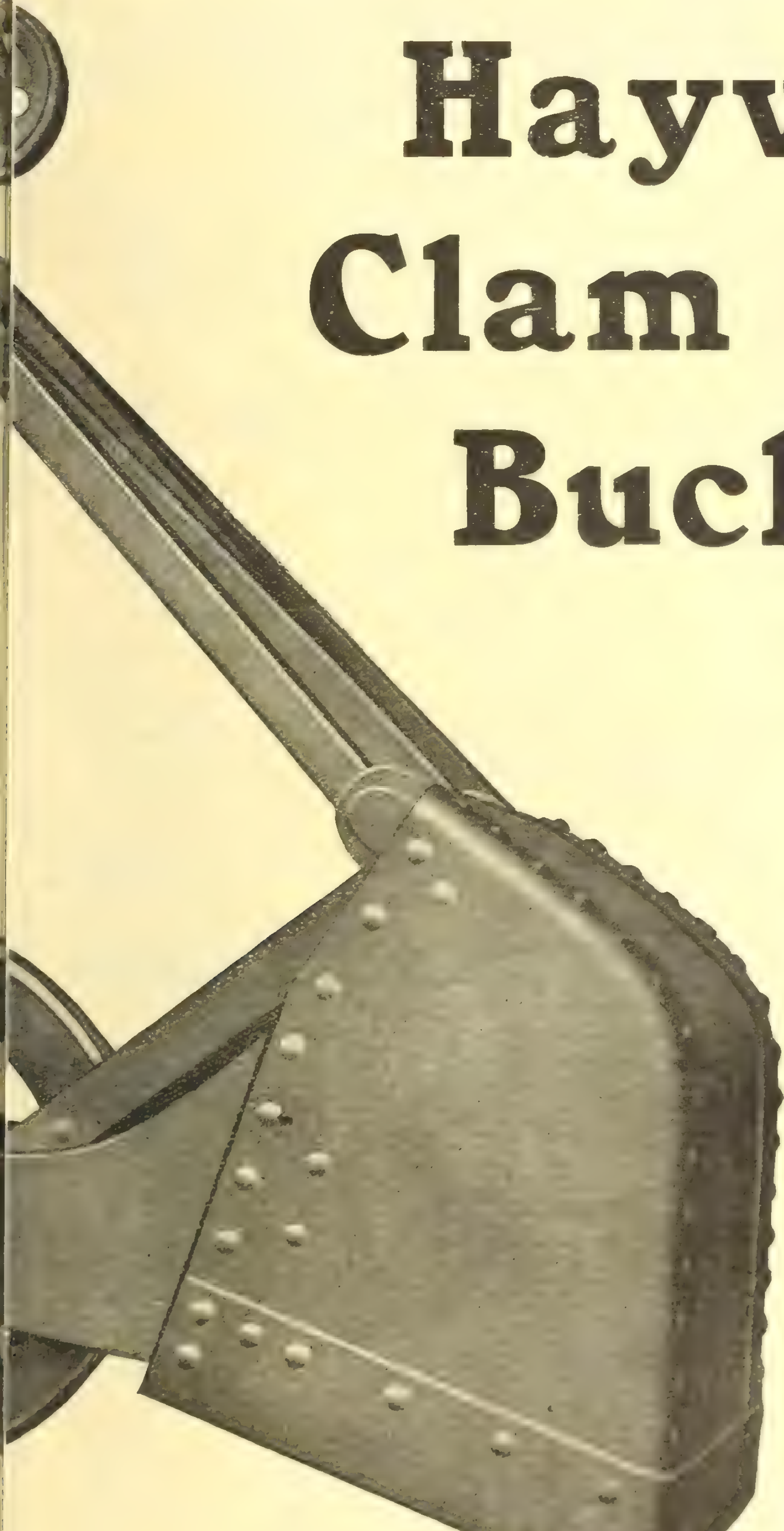
We can supply several styles of both Orange Peel and Clam Shell Buckets, and any size desired.

Montreal, 318 St. James St.
Toronto, 73 Victoria St.
Cobalt, opp. Right of Way Mine

MUSSEN

Hayward Clam Shell Buckets



Handle hard and heavy material with greatest efficiency.

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The best Vapour Lamp on the Market for Industrial Lighting

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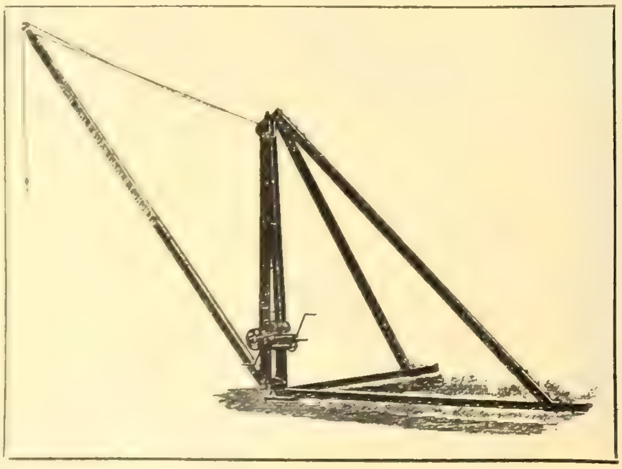
The true test of mechanical efficiency is found in the wear and tear of hard, everyday service. Tried by this exacting test,



John T. Hepburn

Scotch Derricks

have never yet failed to make good. They are designed and built for hard work—under rigid inspection—from the finest materials only—with honest workmanship—outright in our own shops.

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Responsibility of the Public Press

The recent investigations at Woodstock, Ont., have been productive, as might have been expected, of a certain amount of bungling on the part of the public press. The inaccurate and distorted versions of the newspaper reporter are continually a source of trouble in the technical field. The fact of it is, the value of getting news is impressed upon the reporter so much that it becomes subversive of everything else in his composition. The spirit in which many so-called "news" items are obtained and published, puts one in mind of the Quaker's advice: "My son, get money; honestly if you can, but get money." There may or may not be a certain amount of worldly wisdom in this principle, but when it is applied to the circulation of reports concerning established institutions and business men of repute, it is time to call a halt.

An announcement was made recently in the Toronto papers that James A. Vance, acting as agent of the Hamilton Bridge Works Company, Limited, paid E. L. Sutherland, one of the municipal officials, a bribe of $50 to secure a contract for a highway bridge. As a matter of fact, the name of the Hamilton Bridge Works Company was not even mentioned at the Woodstock investigation, a statement which is authorized by Judge Snider, the presiding officer, and also by counsel for the Government and County. Upon discovering that the said Vance was not an agent of the company, and that the only transactions that had been made between him and the bridge concern were in the regular way of business as purchaser and vendor, the statements were retracted. Neither apologies nor damages, however, are any compensation for this sort of thing.

The Hamilton Bridge Works are one of the most responsible concerns of the kind in Canada, and they are doing an enormous business on their merits and on good sound principles. The slandering of such institutions, whether wilfully or from neglecting to obtain proper confirmation of news reports, is a violation of business ethics for which there is no palliation.

Practical Work in the College

In another column will be found an interesting letter on the Training of the Engineer-Contractor, by Mr. A. W. Connor, Toronto. A brief consideration of this subject is appropriate in this number. Mr. Connor's letter is written in criticism of an article by Mr. W. R. Harris, published in our issue of November 2, and of a reply thereto by Mr. Henry Holgate, of Montreal, in that of November 23. Inasmuch as the matter was discussed editorially in the latter issue, it is not our intention to make extended reference to the subject at this time, but a number of the statements made by Mr. Connor appeal to us as being particularly suggestive. Mr. Connor's opinion coincides to some extent with that of Mr. Holgate, in that the college is *not* the proper place to acquire practical knowledge relating to construction. "I believe it is a great mistake," he writes, "for a college to attempt teaching shop work. This can be done better and more economically in a real shop that has to earn dividends." The two writers agree upon the value of practical work during the vacation, and Mr. Connor admits the force of Mr. Holgate's suggestions in this connection.

All things considered, the impression of Mr. Harris' article is still with us. Possibly he is a little over-enthusiastic upon the value of practical knowledge, but we are living in a practical age and this is excusable. Certain it is that the man who is going to make a success of engineering-contracting in its modern application must have an intimate knowledge of practical work and appliances as well as of design.

"Too much must not be expected of the newly fledged graduate," to quote again from Mr. Connor's letter in this number. Certainly it is folly to put a boy on a man's job. After all, the college has well defined limitations, and while its training and qualifications are indispensable, the real business of life will always start outside. It depends very much upon the man, and the extent to which he tries to improve himself in the practical side of his training. For our own part, we think that there is a certain tendency on the part of the college to sacrifice the practical to the theoretical. This tendency can be counteracted to a certain extent by the profession itself, but too much must not be expected.

Toronto Branch, Can. Soc. C. E.

At the annual meeting of the Toronto branch of the Canadian Society of Civil Engineers, held at the Engineers' Club on Friday, Jan. 6th, Dr. Galbraith in the chair, the following officers were elected for 1911: Chairman, H. E. T. Haultain; Secretary-Treasurer, A. C. D. Blanchard; Executive, T. C. Irving, Geo. Powell, P. Gillespie, W. E. Douglas and E. A. James. The reports submitted were adopted and forwarded to the Canadian Society. The Auditor's report showed a balance of $130 to the good.

Annual Meeting of the Ontario Good Roads Association

Active preparations are being made for the annual meeting of the Ontario Good Roads Association, which is to be held in Toronto March 1-3. Mr. W. A. MacLean, the Provincial Highways Engineer, who is Secretary of the Association, is working energetically in the interests of the convention and a most interesting programme is being prepared. Special arrangemens are being made in the way of transportation. A record gathering may be expected.

1910 Was Canada's Greatest Building Year

Twenty Five Leading Cities Expended nearly One Hundred Millions—An Average Gain of 44 per cent—Optimistic Forecasts for Coming Season

The building returns for 1910 submitted by the principal cities of the Dominion, show an average increase of 44 per cent. over 1909. In 1910 the expenditure was $94,180,778, compared with $65,459,456 for the preceding year. December, 1910, showed an increase of more than two and one-half millions over December, 1909. These figures, taken in conjunction with the favorable indications for 1911, should be a source of much gratification and encouragement to those interested in building and engineering work throughout the Dominion. In the reports received from city engineers, city clerks and building inspectors, the consensus of opinion is that the standard of prosperity set up by 1910 will be raised to a still higher level during 1911. In connection with the average increase of 44 per cent. for the year, it is significant to recall that the returns for the first six months of 1910 showed an average gain of 41 per cent. A greater falling off might have been expected towards the close of the year, in view of the fact that an effort is always made to get an early start on the more important works of the season. The final returns for 1910 are indicative of natural and healthy progress in all departments. The average increase of 44 per cent. is a representative figure for the Dominion.

Town or City.	Dec., 1909.	Dec., 1910.	12 mos., '09.	12 mos., '10.	Approx. Increase for 12 mos.
Toronto	$1,593,365	$1,353,265	$18,139,247	$21,127,783	16
Montreal	166,885	856,800	7,783,621	15,815,859	103
Winnipeg	33,425	970,250	9,226,825	15,106,450	64
Vancouver	512,919	958,775	7,258,565	13,150,365	81
Calgary	151,550	354,300	2,420,450	5,589,594	131
Ottawa	104,125	174,350	4,527,590	3,040,900	33*
Hamilton	69,300	49,550	1,623,100	2,604,605	60
Fort William	247,800	404,135	2,970,365	2,381,125	20*
Regina	9,025	30,625	749,194	2,352,288	214
Victoria	71,700	131,750	1,673,420	2,273,045	36
Edmonton	9,780	141,321	2,128,166	2,159,106	1
Lethbridge	33,885	25,450	1,268,215	1,210,810	4*
Port Arthur	......	76,800	584,810	1,062,615	82
Moose Jaw	......	25,000	497,440	1,060,290	113
Brandon	60	6,368	350,120	932,385	166
London	32,155	63,085	850,134	805,074	5*
Brantford	......	62,500	439,335	681,030	55
Peterboro'	2,095	9,240	343,489	517,958	51
Halifax	33,550	18,770	630,379	471,140	25*
Windsor	2,500	22,700	392,040	423,885	8
Strathcona	1,200	10,200	572,330	373,670	35*
Sydney, N.S.	7,700	12,800	160.470	347,554	116
St. Thomas	5,700	10,150	261,600	286,650	10
Kingston	......	495	452,695	220,092	51*
Stratford	2,017	1,068	155,856	186,504	20
Totals	$3,090,736	$5,769,747	$65,459,456	$94,180,778	

*Decrease.

Average increase 44 per cent.

In the accompanying table several decreases will be noted. In a number of cases, however, these are attributable to some exceptional inflation the previous year, as may be gleaned from the reports. Toronto maintains its place at the head of the list with an increase of 16 per cent. During the first six months of 1910 a gain of 11 per cent. was recorded over the corresponding period of 1909, so that the final return can only be regarded as an evidence of steady development and well maintained prosperity.

Perhaps the most noteworthy feature of the returns is Montreal's gain of 103 per cent. The figures are particularly striking when it is considered that they are exclusive of the returns from the suburbs. Allowance must be made, however, for the fact that the annexation at the beginning of the year brought in the town of St. Louis, one of the most rapidly developing districts on the island, and other municipalities later on in the year. Thus had the total from municipalities which became part of the parent city in 1910 been added to the Montreal total for 1909, a more accurate basis of comparison would be reached. These former municipalities, now city wards, in 1909 showed building operations amounting to $2,929,800, which, added to the $7,783,621 shown in the city records for the year, would give a total of $10,713,421. As compared then with returns from practically the same area of $15.815,859 in 1910, the actual gain for the year was about 50 per cent., and not over 100 per cent., as would at first appear.

Of the other eastern cities, Hamilton, with a gain of

60 per cent., and Port Arthur, with an increase of 82 per cent., are entitled to special mention.

From Western Canada there is every evidence of consistent development. Winnipeg, which occupies third place in the table, expended over fifteen millions during 1910, and made a gain of 64 per cent. Vancouver, in the fourth position, has a most creditable record, with a gain of 81 per cent. and a total expenditure of only two millions less than Winnipeg. The fifth place falls to Calgary, with an increase of 131 per cent. To Regina belongs the honor of making the highest gain for the year of Canada's leading cities—214 per cent. Only two decreases are to be found in Western Canada, and in neither case are these attributable to any depression in trade.

Further information, retrospective and prospective, will be found in the following reports:

Toronto, Ont.—P. L. Fraser, Secretary, Builders' Exchange, Toronto, writes: "At the end of 1909 there was a general feeling that Toronto had reached the high water mark in the building industry for some years to come. The first six months of the past year dispelled this view and it was generally admitted that the amount of building for 1910 would exceed that of the previous year by several million dollars. This has proved the case and 1910 leads that of the previous year which was the highest by about $3,000,000 or 16 per cent. In fact, Toronto permits this year are several millions higher than any other Canadian city.

The question is being asked, "Is Toronto not over building?" There seems to be nothing to indicate that this is the case. Outside of the buildings that are erected under contract, the reports from the speculating builders are the very brightest. In the majority of cases, they report having sold their complete number of buildings. The only danger existing that should cause any one to have a pessimistic view are the inducements that the West offers for investment. As long as we can hold our money in this city there is no reason why the building industry should suffer any relapse.

Conditions have been good the year through. The continual fine weather was a great factor in facilitating the work. There were no serious labor troubles and always sufficient workmen to carry along operations. The contractors experienced most trouble in acquiring supplies. Brick has been scarce all the year and the G.T.R. strike was a source of delay in securing lime, gravel, stone and other supplies from outside points.

Prospects for 1911 at this date seem even brighter than at this period a year ago. There is much large work under way, and along with the uncompleted work of last season, such as the new General Hospital, the indications are for a very busy year.

Montreal, Que.—Correspondence of the "Contract Record."—As will be seen by the above returns there was no abatement of activity in Montreal in 1910. Building conditions throughout the year were most satisfactory and there was a comparative immunity from labor troubles. Many important projects are under way and contemplated. The city itself has a most extensive programme. Generally the outlook for 1911 is excellent.

Winnipeg, Man.—City Building Inspector Rodgers, who has earned a reputation by virtue of his ability to forecast building conditions and totals, expects the year 1911 to at least equal 1910, with a total of over $15,000,000. Present conditions are satisfactory. Things are rather quiet in the supply business, but a considerable amount of winter building is going on. It is stated that more bricklaying and carpentry work has been carried out in Winnipeg this winter than for years past.

Vancouver, B.C.—S. H. Jarrett, Building Inspector, writes: "In closing the year's business it is very gratifying to report such a substantial increase over 1909. The increase is phenomenal when it was made without taking in any new territory. The present area of the city is only 8 square miles. In the outlying portions I can safely say that $4,000,000 worth of building has been done. For this my record gets no credit."

Calgary, Alta.—The year 1910 has been a record one from a building standpoint and is easily ahead of any other year in the city's history. Building Inspector Harrison looks for an advance in 1911 and it is hoped that the seven million dollar mark will be reached. This is most probable owing to the enlargement of the city boundaries.

Ottawa, Ont.—Correspondence of the "Contract Record."—Commercial building in the city during 1910 was heavier than for years but from an all-round building standpoint the year was not so satisfactory, the activity being confined pretty much to the one class of work. The outlook for 1911 is good. An increase in residential work is looked for. The following is a comparison of the wages prevailing last year in Ottawa with those of Toronto and Montreal:

Masons and bricklayers, per hour, Toronto 50 cents, Montreal 50 cents, Ottawa 50 cents (increasing to 52 on May 1 next).

Stonecutters, per hour, Toronto 50 cents, Montreal 40 cents, Ottawa 50 cents.

Marble cutters and setters, per hour, Toronto 30 and 40 cents, Montreal 37½ cents, Ottawa 35 to 40 cents.

Cement finishers, per hour, Toronto 40 cents, Montreal 30 to 35 cents, Ottawa 25 to 30 cents.

Laborers and hod carriers, per hour, Toronto 25 cents, Montreal 15 to 22 cents, Ottawa 25 cents.

Painters, per hour, Toronto 30 cents, Montreal 25½ to 30 cents, Ottawa 27 to 30 cents. Paperhangers 30 cents.

Electricians, per hour, Toronto 30 cents, Montreal 25 to 27½ cents, Ottawa 25 to 35 cents.

Sheet metal workers, per hour, Toronto 33 cents, Montreal 30 cents, Ottawa 35 to 45 cents.

Plumbers, per hour, Toronto 42½ cents, Montreal 30 to 35 cents, Ottawa 39 to 43 cents.

Steamfitters, per hour, Toronto 42½ to 47 cents, Montreal 30 to 35 cents, Ottawa 39 to 43 cents.

Plumbers' and steamfitters' helpers, per hour, Toronto 15 cents, Montreal 7½ to 15 cents, Ottawa 8 to 15 cents.

Gasfitters, per hour, Toronto 40 cents, Montreal 30 to 35 cents, Ottawa 39 to 43 cents.

Roofers, per hour, Toronto 30 cents, Montreal 25 to 30 cents, Ottawa 30 to 45 cents.

Carpenters, per hour, Toronto 35 cents, Montreal 25 to 30 cents, Ottawa 25 to 32 cents.

Tile setters, per hour, Toronto 50 cents, Montreal 25 cents, Ottawa 25 to 40 cents.

Lathers, per thousand, Toronto 42 cents, Montreal 44 4-9 cents, Ottawa 45 cents.

Plasterers, per hour, Toronto 50 cents, Montreal 40 cents, Ottawa 40 to 42½ cents.

Hoisting engineers, per hour, Toronto 35 cents, Montreal 25 cents, Ottawa 30 to 40 cents.

Ornamental iron setters, per hour, Toronto 30 to 35 cents, Montreal 25 to 30 cents, Ottawa 30 to 35 cents.

Structural iron setters, per hour, Toronto 25 to 35 cents, Montreal 33⅓ cents, Ottawa 30 to 35 cents.

Hamilton, Ont.—The substantial increase recorded during 1910 by this city is regarded with much satisfaction by Building Inspector Anderson, who writes: "1910 was a good year but the prospects for 1911 are even brighter. We look forward to a very busy year in the erection of factory buildings. A number of important additions are contemplated and several new concerns will erect large plants."

Fort William, Ont.—S. Macnamara, Building Inspector, writes: "1910 was a record year at Fort William. Our figures are somewhat lower than for last year, but it is owing to the fact that elevator work was practically eliminated, only one permit having been issued, representing an outlay of $235,000, whereas last year the permits for elevator work totalled one and a half millions. The increase in factories, business blocks and warehouses more than compensates for the apparent decline. This year shows a marked improvement on the previous one in the class of dwellings, blocks and stores erected—larger, better and a more lavish expenditure of money. Altogether the year's work has exceeded the most sanguine anticipations, and apparently little relaxation will take place during the winter months. Spring prospects look good."

Regina, Sask.—R. G. [illegible], Secretary, Board of Trade.

writes: "Trade conditions in Regina and in Saskatchewan generally were never better than in 1910. The prospects for 1911 are even brighter. The grain crop was exceptionally good in this locality last season and this accounts to some extent for the excellent local trade. It is the consensus of opinion that 1911 will be the greatest year in our history. Important municipal improvements are contemplated, these including the installation of a street railway, the building of the Board street subway, extensive water and sewer additions, disposal works, street paving, etc. The entrance of the G. T. P. with five lines into Regina and the opening of additional branch lines of the C. P. R. and C. N. R. will doubtless attract new industries and give a general impetus to business. It is estimated that the building during 1911 will exceed the three million dollar mark."

Edmonton, Alta.—Ernest H. Cotterhill, Superintendent of Buildings, writes: "Last year was Edmonton's busiest season. The work done was $1,000,000 above the value of the permits, as several large works, such as the new Parliament Buildings and the new Court House, commenced one or two years ago, have been in full swing this season. The prospects for the coming year are very bright. The spring will see the commencement of a number of metropolitan buildings, between 6 and 10 storeys high. The architects are all busy and report numerous projects."

Lethbridge, Alta.—H. V. Meech, Building Inspector, writes: "Building operations here have been delayed somewhat during the last two or three months owing to the early cold weather. This has affected to some extent the year's returns. Judging by inquiries and trade indications, prospects for the spring are bright."

Port Arthur, Ont.—J. McTeigue, City Clerk, writes: "During the past four or five years building conditions in this city have been healthy and regular. A noteworthy feature is the improvement in the class of structures erected. The prospects for 1911 are excellent."

Moose Jaw, Sask.—W. F. Heal, City Clerk, writes: "The building prospects for Moose Jaw for the year 1911 are higher than they have been before at this season. It is anticipated that a number of new business blocks will be started as soon as spring opens. Among other buildings assured are Gordon, Ironsides and Fares' new packing plant, the Saskatchewan College, armory and market building. A large number of other buildings are in contemplation, but nothing definite has been announced. The Canadian Northern and Grand Trunk Pacific Railways will reach Moose Jaw early in the year, and the outlook is that 1911 will be the biggest year that Moose Jaw has yet had."

London, Ont.—Arthur E. Nutter, City Architect, writes: "The general character of the work done this year has been largely in the form of permanent improvements to existing property, this accounting for the large increase in the number of permits and the slight falling off in value, and indicating permanence and stability of existing institutions, rather than the launching out into new and possibly "wild cat" ventures. The prospects for 1911 are good. The proposal of the Council to erect a new $150,000 or $125,000 City Hall is an index of the feeling for progress, and undoubtedly will have a beneficial effect in inciting emulation on the part of other building owners."

Brantford, Ont.—T. Harry Jones, City Engineer, writes: "The record for 1910 is the greatest in the history of the city. It exceeds that of the previous record year, 1907, by $167,000. Prospects are good."

Halifax, N.S.—F. W. W. Doane, City Engineer, writes: "The value of the work done during the year is less than that shown for 1909. The comparative showing, however, may be very easily misunderstood. The figures for 1909 were unusually large, as the building operations for that year included permits for a large cathedral and other expensive buildings. The figures for 1910 have returned to about the normal sum. The prospects for 1911 do not promise anything unusual and there is no evidence at this date that there will be any building erected of unusual value that will increase the total for 1911 beyond the average. The most important building work for which a permit was issued during the past year was a new building for the Y.M.C.A., which is now in course of construction, the cost of which, when completed, may reach $125,000."

Strathcona, Alta.—A. J. McLean, City Engineer, writes: "With the exception of inside work, building construction has stopped for the winter. There is every prospect of a large increase for 1911."

Sydney, N.S.—D. McD. Campbell, City Engineer, writes: "The prospects for 1911 were never better. A number of substantial brick buildings—stores for the most part—are under consideration. Our returns for 1910 do not include the expenditures on the plant of the Dominion Iron & Steel Company, Limited."

Kingston, Ont.—H. B. R. Craig, City Engineer, writes: "Despite the apparently bad showing of this city, 1910 was a normal year for building operations. The preceding year, 1909, was exceptional, as it included a new building for Queen's University and a new wing for the Hotel Dieu Hospital. Prospects for 1911 are for a normal year."

Woodstock, Ont.—J. H. Morrison, City Clerk, writes: "Prospects for 1911 are bright—more promising than for years. The outlook for industrial buildings is exceptionally good, the commissioners now being in negotiation with several manufacturing concerns. Increased activity may be expected in the line of residential work."

A breakwater at the British Navy Yard at Simon's Bay, Cape of Good Hope, is built with large concrete blocks placed in courses inclined 20 degrees to the horizontal. In order to secure this inclination it was necessary to lay on the rubble mound foundation a triangular bed of concrete for each course, so that the foundation was saw-toothed. As described in "Engineering," London, iron box frames of the exact triangular shape were constructed, the under side consisting of loose bars 1 inch in diameter spaced 6 inches apart. The boxes were lined with canvas to form a bag, which was filled with concrete, the projecting canvas at the top being folded over. The box with its concrete contents, weighing about five tons, was lifted by the crane and deposited on the level surface by divers. The bottom bars were then withdrawn and the frame of the box lifted, leaving a triangular-shaped bag of concrete to set and form an accurate foundation for the lowest tier of sloping blocks.

A breakwater on the east side of the new British Navy Yard at Simon's Bay, Cape of Good Hope, is 86 ft. wide, 6 ft. 3 in. high above the high-water level, 51 ft. high above the rubble mound foundation, and 2,500 ft. long. It consists of two walls 37 ft. apart in the clear, having the space so formed filled with selected material. Coal sheds having an aggregate length of 1,000 ft. and coal handling machinery are placed on the breakwater. The outer wall is uniformly 30 ft. thick and consists of 28-ton rectangular concrete blocks which are placed in courses inclined 20 degrees from the vertical. By this scheme the blocks were readily slid to place, insuring good bearing on their beds, as well as on the ends. This type of construction is carried to the deck level, but above low water there is a stone facing set in the blocks when they were cast. The inner wall, 14 ft. 3 in. thick in the upper part and 19 ft. in the lower, is built of concrete blocks with enlarged ends, which act as keys to tie the wall together. Above low-water level the inner wall is faced with granolithic concrete in courses, with granite stones at intervals to act as fenders for the protection of the granolithic work against rubbing action by the ship's fenders. These courses are backed with concrete. The large blocks in the outer wall were set by a titan crane having a lifting power of 40 tons at a radius of 75 ft.

Steady Progress of Calgary Power Company

The power house and step-up transformer house buildings at Kananaskis Falls, on the Bow river, are nearly completed, and the turbines are being installed. The initial installation consists of two 3,750 h.p. turbines, Jens Orten-Boving manufacture. These will drive two 2,500 k.v.a., 12,000 volt, 60 cycle, horizontal type, Canadian General Electric generators, which were delivered about December 1. The installation of these will be completed early in the new year. The accompanying figure represents the general layout of the Calgary plant. No's 2 and 3 are the units now being placed.

The 55,000 volt, 47 mile, transmission line to Calgary is pretty well completed. The double circuit 12,000 volt, 8 mile line to the Western Canada Cement Company's mill at Exshaw is quite complete, as is also the sub-station at this point, and everything is in readiness for the delivery of 3,000 h.p. to the Cement Company. The transmission wires are carried on wooden poles. Aluminium cable is used throughout and was supplied by the Northern Aluminum Company. The insulators are the pin type, Locke manufacture.

The main terminal station in Calgary is well under way. The station equipment is designed for receiving current at 55,000 volts and stepping it down to 12,000 volts, 24,000 volts and 600 volts. The 600 volt circuit will supply the Alberta Portland Cement Company, who are under contract to use 1,500 h.p. as soon as the system is in operation. The other two circuits will feed the city of Calgary, who are under contract with the Cal-

The dam and headworks are making good progress and everything points to the probability that the plant will be in operation early in the spring.

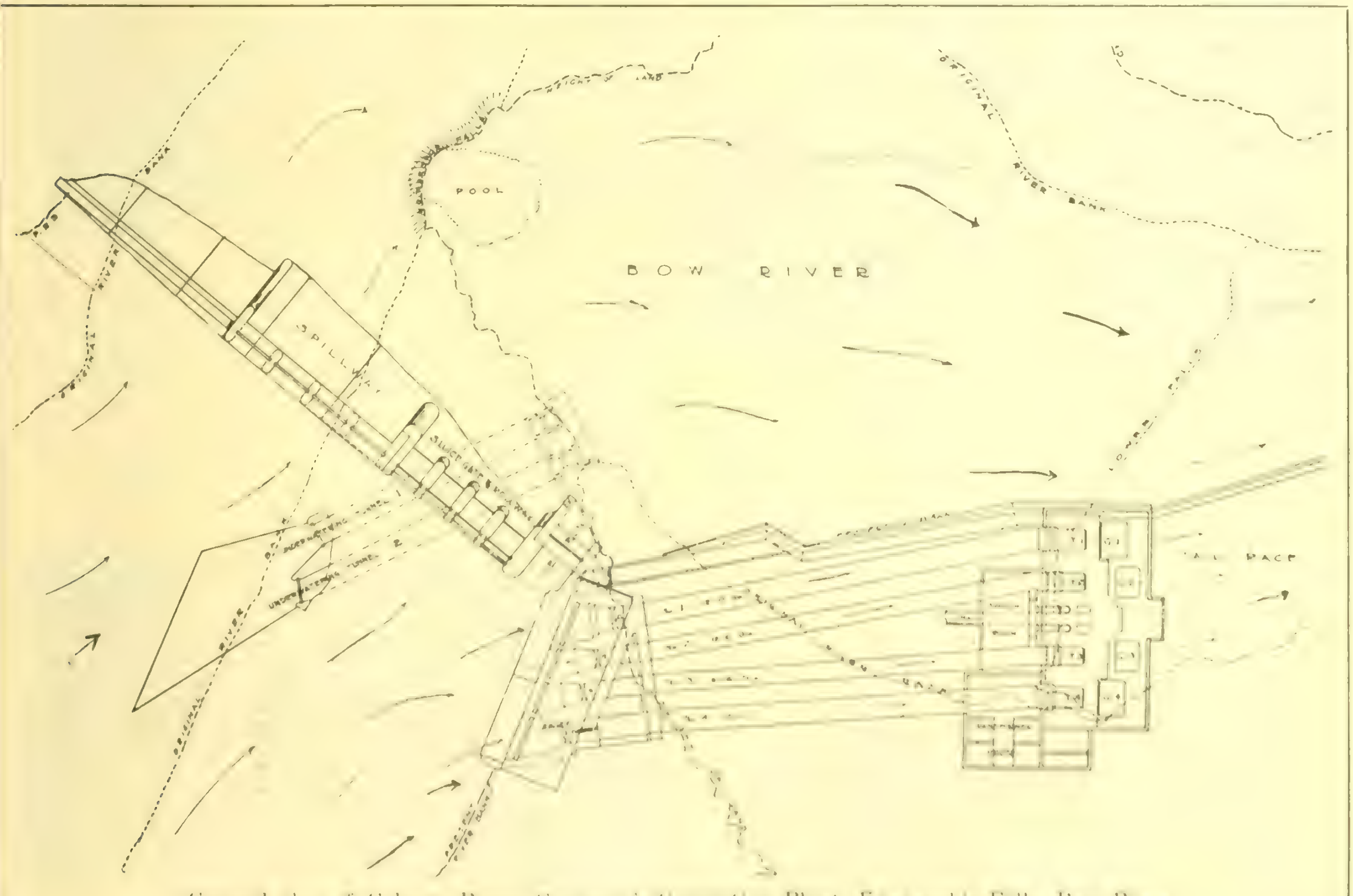
gary Power Company to take a minimum of 2,000 h.p.

The step-up transforming station at the falls will contain three 3,000 k.v.a. 3 phase units and the Calagry terminal station will contain a total of 8,500 k.v.a. transformer capacity to take care of the city of Calgary and the Cement Company. This apparatus is being supplied by the Canadian Westinghouse, as is also all switching equipment for both stations.

Already the demand for more power has necessitated the placing of an order for a third unit, provision for which was made in the original plan of the power house as shown in the figure. The third turbine will be 6,000 h.p. capacity and is already being built. The Wellman-Seaver-Morgan Company, of Cleveland, Ohio, have the order. The third generator will have a capacity of 4,000 k.v.a., and will be installed by the Canadian General Electric Company. The installation of this third unit is to be completed early in the year. Smith, Kerry & Chace, Toronto, are the consulting engineers.

Dry-rot fungus was discovered on the floor joists of a certain house and an examination by Mr. William Ransom, Assoc. M. Inst. C.E., who has reported his findings in the "Surveyor," showed that great sheets of the fungoid growth existed beneath the lath and plaster. After trying a number of preparations to remedy the trouble, treatment of the wood and brickwork with carbolineum is said to have prevented the growth. The Board of Agriculture and Fisheries, Mr. Ransom states, recommends an application of carbolic acid to check dry rot fungus. Creosote, carbolineum and similar preparations, according to Mr. Ransom, should be applied to the ends of timbers resting in buildings as a preventive to the growth of dry rot and the ventilation of ground floor timbers should be assured by the provision of sufficient air bricks.

Mr. R. A. Brocklebank was elected President of the Calgary Builders' Exchange at the annual meeting of that body on Jan. 11th.

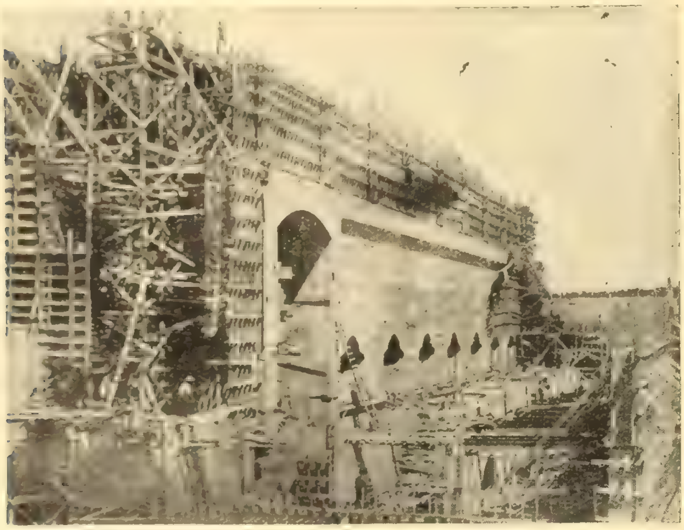


General plan of Calgary Power Company's Generating Plant, Kananaskis Falls, Bow River

Point du Bois Hydro-Electric Development

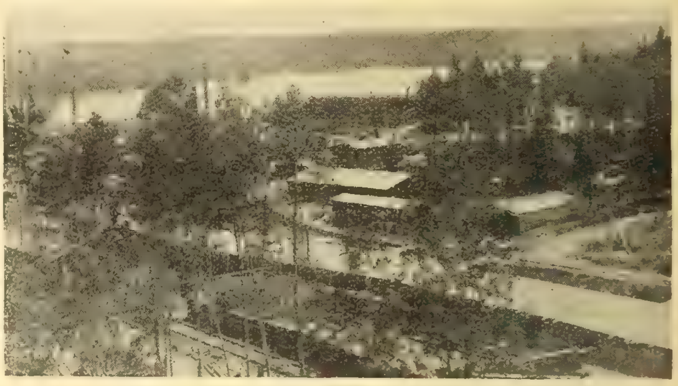
City of Winnipeg's Important Enterprise on the Winnipeg River—A Brief Outline of Design, Construction and Progress—Equipment

The work at Point Du Bois is being carried on by the city of Winnipeg as a municipal investment. Surveys were begun in 1905, but actual construction work was not begun until 1909. However, a standard gauge railway twenty-four miles long, was built from Lac du Bonnet eastward during 1907-8, an investment of about $400,000 being made in this track and in the two considerable bridge crossings of the north-flowing branches of the river. The Consulting Board, consisting of Messrs. C. B. Smith, William Kennedy, Jr., and Col. H. N. Ruttan, reported in 1906 on the available sites and on the cost of development at Point du Bois, setting this, along with the cost of transmission line and transformer station in Winnipeg, at $3,250,000. The work of construction and equipment is now well in hand, and it has been shown that the estimate made by these gentlemen is practically correct.


1.—Power Station.

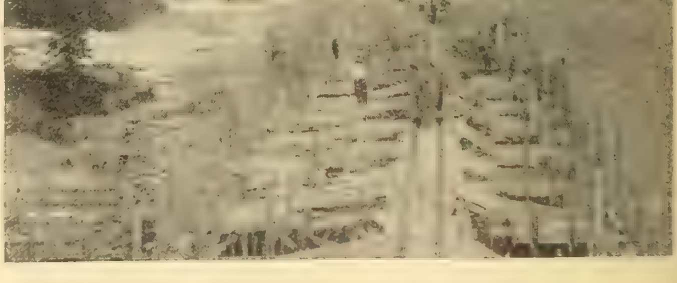
The Winnipeg River is very similar in drainage area to the Ottawa River and has a large proportion of lake area, though the watershed has not as yet been so nearly denuded of timber. The discharge of the river is therefore much more uniform than that of the Ottawa, and the minimum flow at Point du Bois is sufficient to guarantee a twenty-four hour output of 60,000 horse power, for which dimension the general works are laid out.

The general arrangement of the works at the generating station, consisting of a canal cut across two rocky points of land, a series of river walls, rockfill dam and power house, is noteworthy. At the present stage the canal excavation is nearly completed; the river walls and intake have been finished; the power house building, half of which is now being built, is being roofed and the travelling cranes are erected therein; the rockfill dam is about three-quarters completed, having been built eastward from the west shore. The natural waterfall at the site was thirty-two feet, but by the city's construction this has been increased to forty-five.


2.—General View of Plant.

The power house building contains all of the equipment necessary to transform the energy of the entering water into electric current for transmission. There are five distinct compartments in the building—the rack and gate room, the turbine chambers, the generator room, the transformer and switch room and the arrester compartments. The building is one hundred and fifty feet wide and one hundred feet high. The present construction is two hundred and fifty feet long and the building is five hundred and four feet long. Special features which may be noted are the great area of the racks and the method of support, the larger inlets to the wheelpits, the wheelpits themselves, which are a series of circular tanks, the compact arrangement of generating and transforming apparatus and the liberal water passage at draft tube and tail race. The fluctuation of head expected at this point is about three per cent. of the average head. The first view shows the power station with wheelpits completed, but forms not removed, the south and east end walls of the building not being yet formed up.

The second illustration shows the contractors' temporary structures and the power house in the far distance (cent re of the picture). In the foreground are the cement sheds, and to the left may be seen the city's engine house and coal dock. In the middle ground may be noted the smokestacks of the contractors' air compressing and rock crushing plant, the elevator of which is seen alongside. To the far left may be seen the canal wall, completed to the neighborhood of power house. This view is looking down the river. Photograph No. 3


3.—Constructional View from Power House.

is taken from the roof of the power house looking down upon the forms for the construction of the walls above the wheelpits. The natural fall is shown well to the background, and to the extreme left may be noted the easterly end of the rockfill dam.

The last view, No. 4, is taken from the canal wall looking north-easterly, and shows some of the laborers' cottages in the foreground, the upper portion of the waterfall to the right and rockfill dam and river wall No. 1, which is the overflow. There is altogether a length of fifteen hundred and fifty feet with crest at the same elevation as the crest of this overflow wall.

The transmission line consists of a series of double circuit steel towers upon concrete foundations, and carrying at present two circuits of aluminum cable of capacity of 11,250 K. W. each. At the date of writing about one-half of the cable is strung and the steel towers are erected for a further quarter of the line.

The terminal station building is ready for the roof. The building is of red brick and stone, erected on Point Douglas and occupies the north end of a city block facing on the river. It is built at present to accommodate a capacity of 24,000 K.W. in transformers, 16,000 K.Ws. now being installed. The transformation in this station is from 60,000 volts to 12,000 volts; the frequency of transmission is 60 cycles.

The equipment for these stations is in an advanced stage of manufacture: four water turbines are received and all are shipped; the first generator has recently passed satisfactory tests in the manufacturers' shops; four of the high tension transformers have also passed satisfactory tests and are shipped.

4. Point du Bois Development

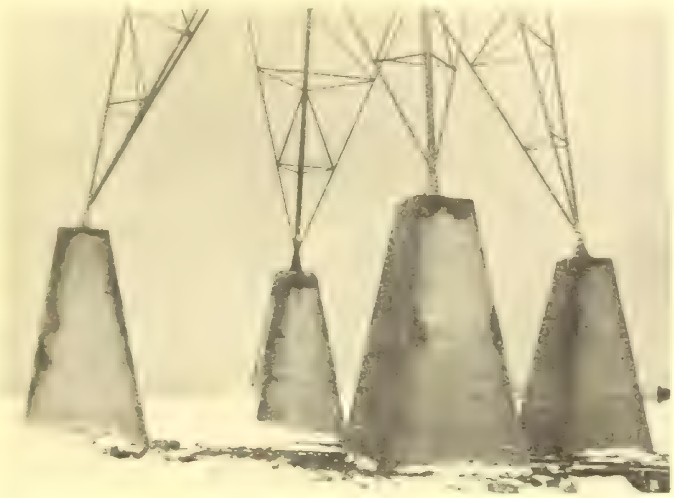
It is hoped that the plant will be put into operation on or about July 1st. next.

Concrete Tower Bases in Lake Ontario.

The hydro-electric transmission line enters Toronto along the lake front from a point just east of Swansea to the foot of Jamieson Ave. The construction of concrete bases, in the water, to carry the transmission line towers proved to be a very interesting and important feature of this work. It was necessary that the tower bases should be of ample strength, not only to carry the towers, but also to resist lateral pressure of ice, which at times is very severe.

The design finally adopted for these tower bases consisted of four separate bases of solid concrete, three feet square at the top, eight feet square at the bottom, and about fifteen feet above water level,—Fig. 1. Each of these concrete bases was reinforced by eight steel rods one inch square, running from top to bottom. Four bolts 1½ inches in diameter, and 6 feet long were placed in the top of each base, as an anchorage for the steel towers. It was orginally intended to carry the concrete down to rock where possible.

Nine sets of these tower bases were built by Wells & Gray, Limited, and nine by the Foundation Company, Limited, both of these firms being sub-contractors under the F. H. McGuigan Construction Company, the general contractors for the hydro-electric transmission line work.



1.—Close view of Tower Base; Hydro-Electric Transmission Line along Lake Front at Toronto

The writer is only familiar with conditions encountered by Wells & Gray, Limited, in the construction of the nine westerly sets of tower bases, to which these remarks are confined.

The first four sets built were behind the sea wall, and since they were protected from the action of waves and

2.—View of Hydro-Electric Transmission Line, Toronto ing. It was considered sufficient to carry the concrete down to good solid earth. The foundations were prepared by driving 2-inch sheet piling about four feet into the lake bottom, pumping out the water and excavating about three feet of sand, at which depth a bed of firm gravel was found.

On the first foundation east of the sea-wall, an attempt was made to carry the concrete down to solid clay or rock. Anchor piles were driven and heavy whalings 6 inches x 8 inches were provided inside and outside of the sheet piling, which was of 3-inch southern pine. An automatic steam hammer was used. After excavating about seven feet of sand, it was found impossible to keep the excavation dry with two pulsometer pumps supplied with steam from a 30 H.P. boiler, and on taking soundings it was found that it would be necessary to go nine feet further to get a good solid foundation. This would be very expensive procedure and it was decided that driving piles would be much cheaper. Accordingly, the remaining foundations were prepared as follows: five piles 12 inches in diameter at the top were driven under each base, and three extra piles were driven under the bases most exposed to ice action. After the piles were driven, the foundations were prepared in the same way as they were prepared for the tower behind the sea wall.

Since these towers are located close to the shore (from 100 to 150 feet), the concrete was mixed by machine on the shore and wheeled in barrows over runways built from the shore out to the work. The concrete was first brought up to water level, and after it had set sufficiently the forms for the upper part of base were put in place and filled with concrete. Enough forms were provided for two complete towers, these forms being used four or five times.

The work done by Wells & Gray, Limited, was completed in eight weeks. It included the driving of 175 piles, driving 36 M. feet of sheet piling, building 1,500 lineal feet of runway over water, excavating 360 cubic yards of sand, building forms for and depositing 1,250 cubic yards of concrete, placing reinforcing steel, unwatering excavations, etc.

Operations were commenced on October 3, and although the contractors, who were working under a heavy penalty for non-completion by December 1st, were delayed a great deal by rough weather, they succeeded in completing the work well within the time limit.

Since the original contracts were completed the Hydro-Electric Power Commission have filled all around these tower bases with rubble stone, as an additional protection.

Water and Sewer Systems at Wetaskiwin

Problems Encountered in Design—Interesting Features of Various Sections of the Actual Work—Construction Remarkable for its Economy

The subject of waterworks and sewers for the city of Wetaskiwin, Alta., was first brought up in 1907. As a start, three cased wells were sunk to form the basis of the water supply, and some materials were ordered for the distribution system.

The financial depression in the following year held the works in abeyance until June, 1909, when they were put into the hands of the John Galt Engineering Company, under whose supervision they have been carried to completion. Water was delivered to the consumers and the sewers were available for use within a year from the above date, viz., in June, 1910. The following is a brief description of the systems:

The water supply is obtained from three drilled wells 10 inches diameter and about 240 feet deep, cased with wrought iron pipe—the three wells yielding an ample supply. Water is raised from the wells by compressed air, discharged into the 3-inch delivery pipes near the bottom of the well through a "Harris" air-lift nozzle, and delivered to a covered reinforced concrete reservoir.

Figure 1 shows the pipe connections to No. 1 wellhead. These wellheads have since been protected by a wood house over each. The reservoir is circular on plan 60 feet diameter and with 10 feet depth of water, giving 176,000 Imperial gallons capacity. The circular walls are 8 inches thick, and walls and floor are reinforced with Kahn cup bars. Ceresit waterproofing was used and there have been no leaks. The reservoir is covered with a wooden roof supported on concrete columns.

From this ground reservoir the water is pumped to the mains and to the elevated steel tank, which is situated on a knoll at the west end of the town.

The power house is of solid brick construction with flat roof and hardwood floor. The foundation walls are concrete, and the basement is the full size of the building. The building contains a Deane triplex pump of 500 gallons per minute capacity, direct connected through a clutch to a 50 h.p. Westinghouse vertical gas engine; also an electrically driven Ingersoll Sargeant air-compressor with automatic regulation, to supply air to the wells. The air receiver pipe connections to pump, etc., are contained in the basement. The gas engine is operated on producer gas from the adjoining electric light plant, with a small proportion of natural gas.

Room has been left in the building for another pumping unit, which will be either gas or steam driven, depending upon the success or otherwise of a well now being driven for gas.

The elevated steel tank shown in Fig. 2 has a capacity of 176,000 Imperial gallons, and a height of 120 feet to the balcony. The tank and riser pipes are entirely protected with a wooden frost casing, and provision has been made for heating when necessary. The tank was supplied and erected by the Ontario Wind Engine and Pump Co. An electrically operated valve, controlled from the power house, is being installed to close off the tank when a fire call is rung in.

The distribution system consists of about six miles of cast iron pipe 10 inches to 6 inches diameter, with the usual gate valves and about 50 fire hydrants. The domestic pressure from the elevated tank is about 75 lbs. per square inch, and the fire service, direct from the pump now installed, is at the rate of 500 gallons per minute at 100 lbs. pressure at the hydrant. The whole system has been very favorably reported on by the Fire Underwriters' inspector.

A meter is being installed on the supply main at the power house and all domestic and other services are being metered.

The sewer system presented a difficult problem on account of the very flat topography. There appeared to be no natural outlet, and pumping seemed to be inevitable. After considerable prospecting, however, an outlet was secured to the north-east, and a gravitation outfall constructed discharging to a creek at a point 3½ miles from the town. Ground has been secured at this point as a site for sewage disposal works, but the construction of the works has been postponed as a result of the memorandum issued last year by the Alberta Provincial Board of Health. The entire system is constructed of vitrified tile pipes from 8 inches to 20 inches diameter, there being approximately 5 miles of collecting sewers within the town limits.

Unusual difficulties were experienced on the main intercepting sewer on account of the nature of the underlying strata which consisted of a fine wet silt underlying a layer of running sand. The silt soon worked up into liquid mud and special methods of timbering had to be adopted. All pipe joints on their sections were entirely surrounded by a solid block of concrete. The manholes were all built of cement brick and cement coated inside and outside. There are upwards of 120 manholes in the system.

It will be of interest to note that these works were carried out by administration (or the "day labor" method) under the supervision of the engineers, and that this method has proven satisfactory in every way. In order to satisfy any doubts on the part of the citizens, the council obtained tenders for a considerable portion of the works this year. As a result it was demonstrated that the work was being done under administration at prices which the contractors could not approach, although they were bidding on the "easy" portion of the work, the more difficult "wet" sections having already been completed by the engineers under "day labor." The fact that nearly 6 miles of water mains were laid without one leaky joint speaks for the quality of the work. The noticeable absence of any law suits or even of any serious dispute is a further point of interest, also the fact that there were practically no injuries to workmen, and that the works were completed three months within the contract time.

1.—Wellhead No. 1, showing air line and discharge pipe

The estimated cost of these works was $250,000, based on current contract rates. A sum of $22,000 has been retained to complete the sewage disposal works and install the additional pumping unit, leaving $228,000 as the estimated cost of the portion constructed. The actual cost of construction was $217,000, including engineering, time-keeping and inspecting, land, insurance and all charges. The difference of $11,000 has been saved to the city as a result of efficient management, and there can be no doubt that in this instance the "day labor" method of construction has been a success.

2.—Elevated Tank; Capacity 102,000 Imp. Gallons

The principal part of the works was carried out during the term of office of Mayor H. J. Montgomery, who was chiefly instrumental in carrying through the preliminary financial and other arrangements. The engineers were the John Galt Engineering Company, of Toronto and Winnipeg, represented on the ground by E. L. Miles, A.M. Can. Soc. C.E.; and W. L. Crane acted as the city's inspector of works.

Reinforced Concrete Piles are to be used to support about 850 ft. of the centre guide wall of the Gatun Locks. About 3,500 piles will be needed in the foundations; they will be driven to depths of from 20 to 70 ft. The piles will be made of 1:1½:3 concrete and will be cast on platforms about 80 ft. wide and 400 ft. long. Two steam pile drivers, having a maximum height of 93 ft., and equipped with steam hammers weighing 10,000 lbs. will be used in putting down the piles. The hammer will fall about 42 in. and strike 60 blows per minute. A cast steel driving head, containing a cushion of sand and rope fits the head of the pile.

Interesting Bridge Work on N. T. R.

In connection with the work carried out last season by the National Transcontinental Railway, a number of contracts executed by The Hamilton Bridge Works are noteworthy. The first photo shown is that of the completed structure over the Abitibi River, a few miles east of Cochrane, Ont. This is one of the important bridges on this line in Northern Ontario, and it is a fair sample of the excellent class of structures now being erected by the N.T.R.. The total length of this structure is 840 feet and the weight, 2,400,000 pounds. The contract price for the superstructure was close to $100,000. The structure is divided into two rivetted lattice spans, each 210 feet long and 43 feet deep, erected over the main channel of the river. At each end of the channel spans are approaches built on steel towers with deck plate girder spans, the height of these towers varying from 40 feet to 70 feet. The work was carried out under first-class specifications and was rigidly inspected, both in the shops and during erection. The erection of this structure was performed in a similar manner to that described later for the Mistongo trestle.

1.—Bridge over Abitibi River, near Cochrane, Ont.

The remaining views were taken during the process of erection on the Mistongo Viaduct, also on the line of the Transcontinental Railway, about 25 miles east of Cochrane, Ont. This fine structure consists entirely of deck plate girder spans on steel towers. Its total length is 1,070 feet, divided up into eleven spans of 30 feet, eleven spans of 60 feet and one span of 80 feet, all resting on 11 steel towers varying in height from 35 feet to 70 feet. The weight is 1,600,000 pounds, and contract price about $65,000. Fig. 2 shows a portion of this structure erected, and the derrick car lifting up portions of the tower columns ready to place same in position. Fig. 3 shows the Company's erection car running out on the completed portion of the structure and carrying out one of the 80-ft. girders for the long span. It will be noted that one of these girders is already in place. Fig. 4 shows the erection car placing one of the 60-ft. girders of the last span. The method of erecting this structure is the very latest idea in modern bridge practice. It is only within the last seven or eight years that heavy steel construction cars have been used for railway erection work. Previous to that time very light wooden derrick cars of small capacity were used for handling work in sections. Consequently, in most of this kind of work it was necessary to build falsework at very heavy expense and great delay in the erection and completion of structures.

2.—Lowering 2nd. Post, Mistong Viaduct.

3.—Running out Second Girder, Mistong Viaduct.

With cars of the kind used on the work described above it is now possible to place in a very few hours, work which a few years ago would take weeks.

Mr. Gordon J. Grant is chief engineer of the National Transcontinental Railway, and Mr. R. F. Uniacke, bridge engineer. Hon. John S. Hendrie is president, and R. Maitland Roy, manager of the Hamilton Bridge Works Company.

4.—Girder in Place, Mistong Viaduct.

Western Canada Flour Mills' Extension

The Design and Construction of a Modern Reinforced Concrete Building at St. Boniface, Man.—Noteworthy Features of the Work

The addition comprises a concrete handling and cleaning house having a mill cleaning capacity of 3,000 bushels an hour, a system of concrete mixing bins with a storage capacity of 60,000 bushels, together with a concrete storage annex giving a capacity of 325,000 bushels. The elevation of the completed structure is shown in Fig. 1.

The cleaning house is 40 ft. x 50 ft. x 150 ft. high, with two track sheds 85 ft. x 16 ft. located on either side. The mixing bins are circular and eight in number. They are 12 feet in diameter with three interspaces. The height of these tanks is 65 feet, and they are supported on a two-storey concrete mixing house. The storage annex comprises 21 circular tanks made up of three rows of seven each with 12 interspaces or quadrilateral bins, the total height being 80 feet and each tank 16 feet in diameter. These three units, namely, the cleaning house in the centre and the mixing bins and storage annex on either side, are distinctly separate buildings resting on separate foundation slabs, all abutting on one another with slip joints at the junctions.

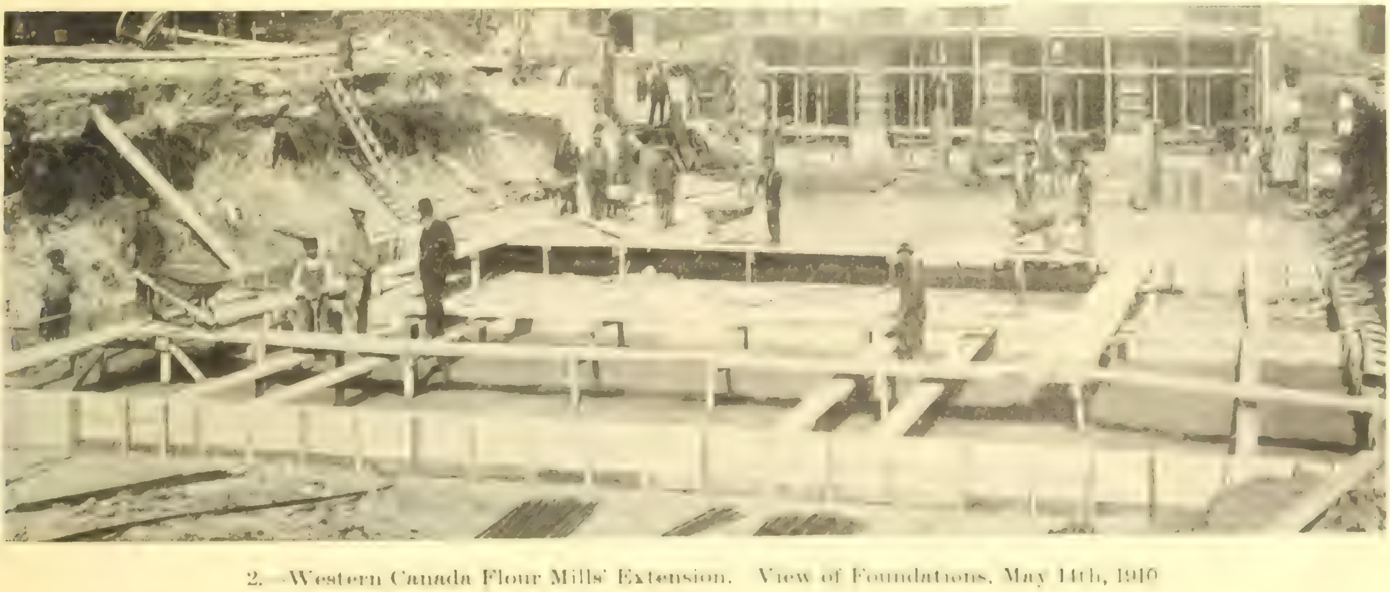
Design.—The plans both in general and detail were prepared in the office of the contractors and embrace a thoroughly fireproof building and machinery installation, the only wood in the entire building being the frames of the cleaners. The foundation slabs for the three units rest upon the soil in the same horizontal plane. The bearing value of the soil is computed to carry with safety a load not exceeding 4,000 lbs. per square foot, and the base of the footing slabs is 16 ft. below the yard grade. The slabs are made up of reinforced concrete 2ft. thick, the top of which forms the basement floors of the working house, mixing plant and conveyor tunnels—Fig. 2. The concrete in the footing slabs and the side walls up to the grade level are composed of one part Portland cement, 2½ parts sand and 5 parts broken stone or gravel. The sand used was a clean coarse grain, the stone crushed to pass through a 2-in. ring, and where gravel was used it was screened to give the same sized aggregates.

The reinforcement was medium open hearth steel and stressed in tension not to exceed 16,000 lbs. per square inch. The concrete was allowed a direct compression load of 600 lbs. to the square inch, and an extreme fibre stress of 750 lbs. to the square inch, vertical shear allowed for concrete 50 lbs. per square inch; ratio of modulus of elasticity steel to concrete, 15 to 1.

The concrete comprising the columns, beams and all floors of the cleaning house was composed of cement, sand and stone, in the proportion of 1 : 2 : 4, and the same mix was adopted in the walls of the storage tanks and the track sheds. The floors and roofs throughout the working house, except the basement, as well as the roof of the cupolas on the tanks, are of combination tile and concrete.

1.—View of Completed Structure

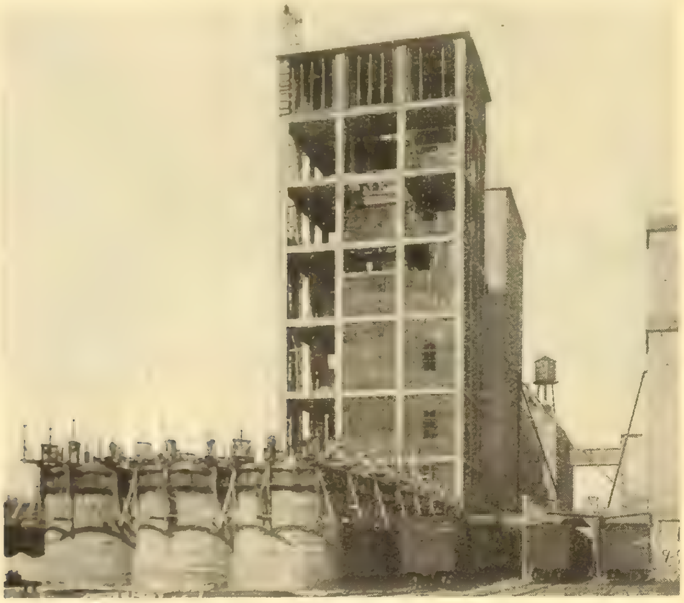
Construction.—After the excavation was completed tile drains were laid along the bottom of the footings leading to a 12-ft. diameter brick sump, located 30 feet away from the building line. As the walls were being built to grade, a broken stone backing of 12 feet in thickness was inserted between the exterior face of the walls and the earth, backfilling extending from the bottom of the slab to the grade level. This prevents seepage and



2.—Western Canada Flour Mills' Extension. View of Foundations, May 14th, 1910 carries off all the surface water about the building. Risers of tile pipe were also brought to the grade level from the main tile drain, for the purpose of connecting down-spouts from the roofs. The sump is 25 feet deep and is fittted with a motor-driven rotary pump, which discharges into an adjoining sewer approximately 8 feet below the yard grade. In this manner rain or surface water is admirably taken care of.

The mixer was placed in one of the receiving pits, which was the first concrete work constructed on the job. A frame tower for the purpose of supporting the guides for a concrete skip was extended upward from the mixer as the work progressed. The concrete conveyed from the mixer into the skip was discharged into a moveable steel hopper which in turn discharged into a gravity steel spout or into concrete carts of the Ransome type, delivering thence to the forms.

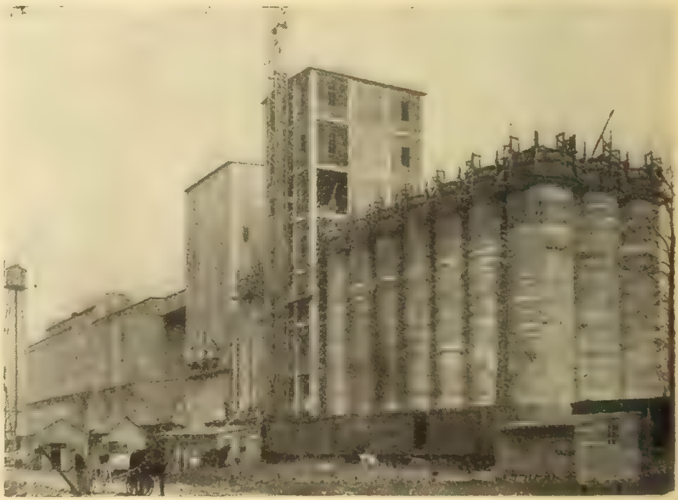
The walls and columns were moulded together from the basement floor to the yard grade. From this point the cleaning house of 8 stories and a roof, and the mixing house to the bottom of the mixing bins, was of skeleton construction, as shown in Fig. 3.



3.—Progress View August 9, 1910

The forms of concrete were of pine boards and planks S 1 S and E, and cut to exact dimensions. These were used over three times. All floor finish work was carried on within six hours after the pouring of the floor, the finish used being 1 of cement and 3 parts coarse, sharp sand. As soon as the skeleton work was stripped the curtain walls of the cleaning house were proceeded with. These were built of solid concrete 6 feet thick poured between sheets of Kahn rib lath which eliminated the necessity of wooden forms. The lath was fastened to Kahn steel studs, spaced 12 inches on centres vertically, and fastened securely into chases which were formed in the sides of the columns and the top and bottom of the wall beams. After the studs were erected the outside of the wall was lathed full height, the windows securely placed in position and the inside wall lathed 3 feet at a time as the concrete was being poured. After the concrete was placed and set the outside of the curtain was plastered with a waterproof mixture of cement and sand in proportions 3 to 1, the thickness of the plaster being 1-in. The inside of the curtain was finished with hardwall plaster and wood fibre, which enabled a smooth and even surface both outside and in, the hardwall plaster giving a more pleasing color than the dark finish which would have been produced by cement.

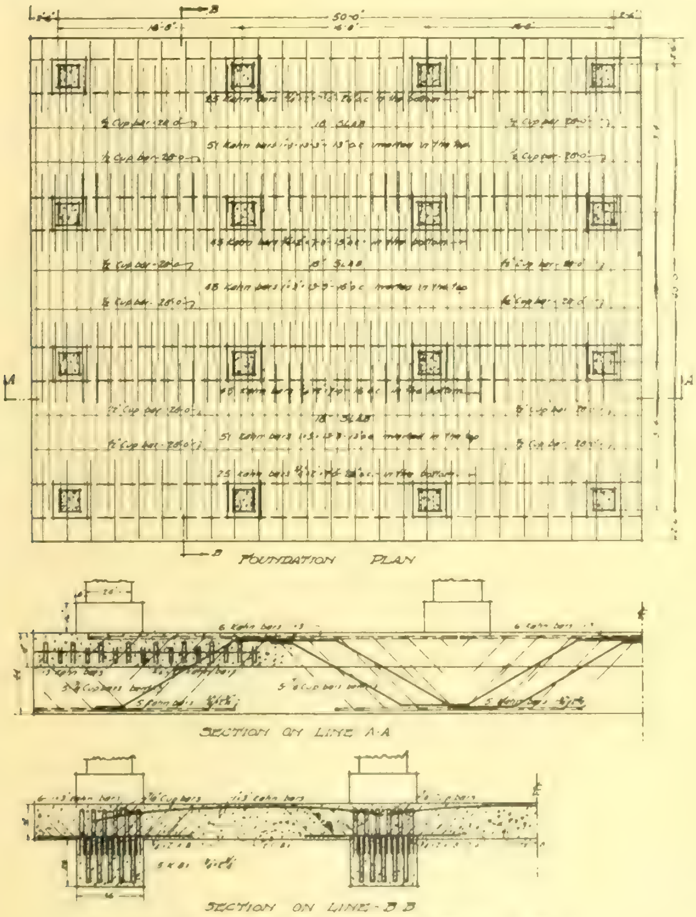
Tank Construction.—The special tanks devoted to the purpose of storing mixed and mill wheat are located a sufficient height above the concrete floor to enable the installation of a harnessed automatic system of weighing before delivery to the mill conveyors. These tanks rest on column and beam construction. The main storage is outlined above. In both sets of tanks the walls are of concrete, 7 in. thick, reinforced both horizontally and vertically with round mill steel, stressed not to exceed 10,000 lbs. per square inch. The bars are placed in the centre of the 7-in. wall and at variable distances apart, and also of different sizes to care for the external pressure of wheat. The forms for the construction of the tank walls were made up of 2-inch lagging 4 ft. long, spiked to segments of the outer and inner surfaces. The segments are supported by the yoke standards. The yokes are of steel channels hung on a shoulder nut which is supported on a screw jack operating with a grip on a 1¼-inch gas pipe. These pipes are embedded in the concrete walls and are continuous from bottom to top. The work of concreting these tanks was continuous night and day, progressing at the rate of 36 inches in height every 24 hours. The lagging was faced with galvanized iron to insure a smooth cast. All tank bottoms are hoppered to the discharge spouts. Each tank is furnished with steel ladders from top to bottom, and charging and discharging spouts, as well as clean-out doors for all exterior tanks. The cleaning house below grade is connected with the old working house by means of a tunnel in which the transfer conveyor belts operate. Openings for ventilation and light are provided in the underground tunnels. The sides of the belt gallery, or cupola, are of similar construction to the walls of the cleaning house. All roofs are covered with a five-ply tar and gravel roof. Eaves, gutters and cornices are of galvanized iron, heavy pattern, and down-spouts are of the same material connecting to the drain risers. All windows are of galvanized steel, glazed with ¼-inch wired glass, the upper sash pivoted and fitted with the necessary fastenings to meet the requirements of the fire underwriters. All doors are of metal and the track shed doors are of the Kinnear roller type. The stairs throughout the cleaning house are of reinforced concrete built at the same time as their respective floors, and all stair-wells and openings are provided with hand rails. Metal doors are placed in the different floors of the cleaning house for the purpose of removing machinery to and from the building.



4.—Building nearing completion, Oct. 14, 1910

Equipment.—Equipment is designed in duplicate, each half of the house being entirely independent of the other, and in general consists of two 30-inch bent conveyors under the tanks to carry the grain to the necessary lofting legs. Instead of discharging the wheat direct from the bins to the belt this is performed by the use of a steel belt loader. There are also 24-inch belt conveyers connecting the extension to the old plant. In the conveyor galleries or cupolas over the annex there are two 30-inch belt conveyors, fitted with trippers of the double discharge, self-propelling type.

There are two receiving legs for elevating from the receiving pits to the scales, each with a capacity of 8,000 bushels an hour; two lofter legs for elevating grain from the basement of the cleaning house to the cupola; one shipping leg for handling wheat to the scales; one lofter leg to deliver mixed grain from the automatic mixing system to the mill bins, as well as a screening leg.



5. — Detail of Working House Footing Slab

There are three 2,000 bushel scales of the Gurney pattern; three 2,000 bushel steel garners; ten No. 92 Invincible milling separators; one Humphrey passenger elevator; two car shipping spouts.

The dust collector system installed in this plant is what is known as the Day type, and is complete in every particular, including a sweep system for each floor. The air vents from the dust collectors are brought to the outside of the building and the dust is discharged through a system of piping to the boiler room of the present milling plant.

The receiving pits, garners, scale hoppers, legs, boots, and all fixed and movable spouting in connection with the machinery installation, are of sheet steel construction.

The separators are driven by independent friction clutch pulleys on the cleaner countershafts and belt connected to the machines. These cleaners are arranged in two groups of five machines each, each group being driven by an independent motor.

The cars are handled through the two unloading sheds by means of two single drum car pullers of heavy pattern and unloaded by two pair of Clark double automatic car shovels.

There are nine motors used to operate the plant, these varying in power from 5 to 100 horse power. They are of the induction type, operating under a three-phase, 60-cycle, 550-volt electrical installation. The main switch board and controllers are on the first floor of the cleaning house, the switches being enclosed in dustproof iron boxes.

Rope drives are used for transmitting power from one floor to another. All clutches used throughout the plant are of the Webster steel plate type.

The electric lighting system, distributing light to the different departments, is what is known as "open conduit work," this being considered more advisable (in the event of the necessity of adding additional lights) than the customary method in reinforced concrete buildings of embedding the conduits in the floors.

Ticket elevators and a complete bell and telephone system have been installed.

It is believed that this house is absolutely fireproof.

The reinforcement throughout the entire plant, with the exception of that used in the concrete storage tanks is the Kahn system, furnished by the Trussed Concrete Steel Company, of Canada.

The plant was designed and built by Geo. H. Archibald & Company, engineers and contractors, Winnipeg.

The tooling of concrete surfaces was discussed by a number of members at the convention of the National Association of Cement Users, and their experience indicated that a hammer with 2 to 16 star points gives generally more satisfactory results than a bush hammer. These hammers are made with diffierent numbers of points. One of the speakers had used with satisfaction a 2-in. square head with 16 points for merely removing the surface film of cement and the board marks without especially exposing the aggregate. This tool, pneumatically operated, is rapid and common labor when once instructed will cover a larger area with it and do the work as well as skilled labor. While the bush hammer gives a fine finish it clogs readily and has a small output. The star-pointed hammer is easily sharpened by merely drawing the temper and using a file on the face to give the desired finish.

The underpinning of a masonry conduit, two 48 in. cast iron water mains, and one 72 in. steel lock bar pipe line is to be undertaken in connection with the building of the new Richmond Hill trunk sewer now under construction in the Borough of Queens, New York City. The existing water works structures are part of the supply system for the Borough of Brooklyn and the sewer will be carried under them in a double-barrel inverted siphon. It is proposed to put in pile footings on either side of the conduit to carry the ends of two heavy steel box girders, each about 46 ft. long and slightly less than 5 ft. deep. From these girders there will be hung by 1-in. steel rods 26-in. I-beam stringers which will support the bottom of the conduit at intervals of 2 ft. Wooden sheeting is to be driven along either side of the conduit to allow the under-pinning to proceed without removing the earth cover from the top and sides of the conduit.

The Canadian Society of Civil Engineers

Programme for the Twenty-Third Annual Convention at Winnipeg Next Week—Work, Aims and Personnel of the Institution

The 25th annual meeting of the Canadian Society of Civil Engineers, which is to be held at the Royal Alexandra Hotel, Winnipeg, from Tuesday, Jan. 24th to Saturday, Jan. 21st, gives every promise of being one of the most interesting and successful conventions ever held by that institution. Arrangements for the meeting have been in active progress for several months, and thanks to the untiring energy of Professor McLeod and to the characteristic enterprise of the Westerners, a programme has been arranged which will make 1911 a red letter year in the history of the Society. Winnipeg, the metropolis of the West, is the centre of a section of the country that has witnessed wonderful developments in the last few years. Many of the most interesting works, from an engineering point of view, have been put under construction during the last year or so—notably the Point du Bois construction and the G.T.P. shops—and altogether the occasion presents a most favorable opportunity for every member of the Society to visit Winnipeg. From the indications received from the various branches of the Society there is every prospect of an exceptionally good gathering.

Col. H. N. Ruttan, President, Canadian Society of Civil Engineers

Since its inception in 1887 the Society has risen steadily in the estimation of the profession, until today it ranks among the foremost institutions of its kind in the world. Its object, as defined in its original charter—to promote the acquisition of engineering knowledge and to encourage investigation in all branches of the profession—has been steadily adhered to, and its achievement in this connection during the comparatively brief period of some 23 years may well be a source of national gratification.

Many valuable papers and reports are scheduled for presentation at Winnipeg, and these, with the ensuing discussions, will be of incalculable benefit to the engineer.

The society has a membership of approximately 3,000 and a large number of its members are resident in Western Canada. Both the Vancouver and Winnipeg branches are in a flourishing candition, and the contingent from Vancouver will doubtless be most representative in view of the special inducements in the way of transportation. The programme of the meeting is as follows:

Tuesday, 24th January.

10 a.m.—Meeting for the nomination of Scrutineers, receiving the Report of Council, reception and discussion of Reports of Committees, and general business of the Society.

1.30 p.m.—Complimentary luncheon by His Worship the Mayor and the Aldermen of Winnipeg.

3. p.m.—Continuation of business meeting for the discussion of reports.

8 p.m.—The members of the Manitoba branch will entertain the visiting members at a smoker in the ball room of the Royal Alexandra Hotel.

Wednesday, 25th January.

9 a.m.—A special train provided by the Canadian Pacific Railway will convey members to the city power plant at Point du Bois and to the St. Andrew's Locks. The members are also invited to visit the Grand Trunk Pacific shops in Winnipeg.

8.15 p.m.—Members' dinner in the Royal Alexandra Hotel.

Thursday, 26th January.

10 a.m.—Meeting for the discussion of Committees' reports and reading of papers.

3 p.m.—Address by the retiring President. Reading and discussion of papers and general business.

Friday, 27th January.

9.30 a.m.—Reports of Scrutineers and general business.

11 a.m.—Meeting of the Council under by-law 33.

The biographical sketches of the officers of the Society for 1910, which follow, will doubtless be of interest at this meeting. We regret one or two noteworthy omissions, but these are attributable rather to individual reticence than to any lack of effort on our part to make this feature complete.

H. N. Ruttan, Winnipeg, Man.—President.

Lieut.-Col. Henry Norlande Ruttan, C.E., President of the Canadian Society of Civil Engineers, has been City Engineer of Winnipeg for the last quarter of a century. He was born at Cobourg, Ont., on May 21, 1848. Previous to his connection with the City of Winnipeg he had extended experience as engineer and contractor on the construction of the Intercolonial and Canadian Pacific Railways. During his term of office he has witnessed wonderful developments in the western capital; indeed, to his own energy and foresight is attributable a good share of the city's advancement. City Engineer Ruttan has had a distinguished military career, having served in the Fenian Raids and Northwest Rebellion. He is the possessor of medals for his part in both of these expeditions. The Long Service Decoration has also been conferred upon him.

He was a member of the first Council in 1887, and has always put forth his best endeavor in the interests of the Society and of his profession. He was elected Vice-President in 1909 and President at Ottawa, January, 1910.

Geo. A. Mountain, Ottawa.—Past President and Hon. Councillor.

Mr. George A. Mountain, of Ottawa, Chief Engineer of the Canadian Railway Commission, has had a long and honorable connection with the Canadian Society of Civil Engineers, of which he is a charter member. He has been a Councillor of the Society ten times and a Vice-President three times, while he was the immediate predecessor of Colonel Ruttan in the presidential chair. Mr. Mountain has taken a keen interest in the work of the Society since its inception. His name has always been included in its various committees, of most of which during some period he has been Chairman. On three occasions he has been Chairman of the Nominating Committee.

As may be supposed, the career of one so prominently identified with the Canadian Society of Civil Engineers has been of considerable interest. A native of Quebec, having been born at the ancient capital in 1860, Mr. Mountain received his earliest training as a civil engineer in the Polytechnical School at Quebec, after which he was connected with Messrs. Kinniple & Morris, civil engineers, London and Greenock, and later with Chevalier Baillargie, City Engineer of Quebec.

Mr. Mountain obtained his first actual experience in 1878, in which year he assisted on the surveys and designing of the Princess Louise Embankment, Quebec, and the graving docks at Levis, Que. In the following year he was employed as transit man on the survey of the Quebec and Lake St. John Railway, now completed. His next appointment was in 1880 as assistant engineer on the Island Railway of Newfoundland, now the Reid Railway, under the chief engineership of Mr. Morris, of Messrs. Kinniple & Morris above mentioned. In 1881 Mr. Mountain joined the engineering staff of the Canada Atlantic Railway, serving as assistant under Chief Engineer Walter Shanley. Three years later he was appointed division engineer, and in 1887, upon the retirement of Mr. Shanley, chief engineer of this road.

One of the noteworthy works carried out under Mr. Mountain's supervision was the Coteau Bridge, 6,000 feet long, across the St. Lawrence River, which was built in 1888 in the record time of ten months and twenty days.

Mr. G. A. Mountain, Ottawa.

The surveys of the Ottawa and Parry Sound Railway, from Ottawa to the Georgian Bay, were commenced in 1890 by Mr. Mountain. The construction, which included elevators and docks at the terminals, was completed in 1897. During this period Mr. Mountain was chief engineer of the Adirondack and St. Lawrence Railway, from Malone to Valleyfield, and also of the Canada Atlantic Railway, from Vermont State boundary to the Georgian Bay, and branches. In addition, he was consulting engineer for the Temiskaming and Northern Ontario Railway Commission.

In July, 1904, Mr. Mountain resigned from the Canada Atlantic Railway to accept the position he now occupies, that of chief engineer of the Board of Railway Commissioners for Canada.

While Mr. Mountain is in every sense of the word an enthusiast in the work of the Canadian Society of Civil Engineers, his interests are naturally wide and varied. He is a charter member of the American Railway Engineering and Maintenance of Way Association, and has served on many of its most important committees. He is also a Dominion, Ontario and Quebec land surveyor. Of his various other connections may be mentioned the Rideau Club and the Moose Lake and Black Bay Fish and Game Clubs.

Last year's convention, held in Ottawa under the chairmanship of Mr. Mountain, was noteworthy in many respects, and among the many impressions that one received at the meeting in the federal capital, the genial face of the President will be the most lasting.

C. H. McLeod, Montreal, Que.—Secretary.

Clement Henry McLeod, B.Sc., Ma.E., F.R.S.C., is so much a part of the Society that he seems to be connected inseparably with its work and future. Some brief particulars of his career are of particular interest at this time, in view of the fact that he is just coming of age as Secretary.

Professor C. H. McLeod, Montreal.

Professor McLeod was born at Cape Breton, N.S., Jan. 21, 1851, and was educated at the Model and Normal schools, Truro, N.S. Proceeding to McGill University, he graduated from the Faculty of Applied Science in 1873.

Upon graduation he was appointed assistant engineer in charge of construction on the Intercolonial Railway, and later, resident engineer on the construction of the Prince Edward Island Railway. He was afterwards engineer of public works in Newfoundland. In 1874 he was appointed Superintendent of the Observatory at McGill University, and in 1888 Professor in the Faculty of Applied Science of that institution. In 1908 he was elected Vice-Dean. He is a Fellow of the Royal Astronomical Society, and has been responsible for many valuable contributions to technical and scientific literature.

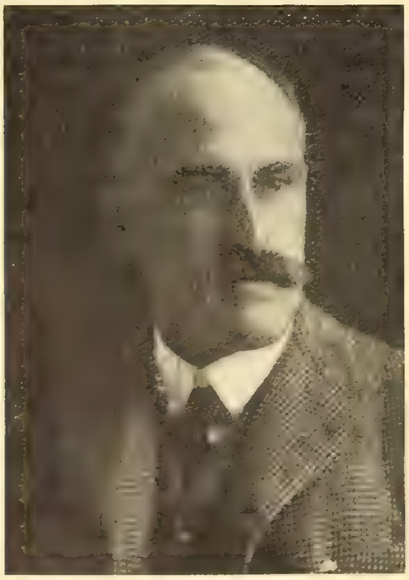
Ernest Marceau, Montreal.—Treasurer.

Among the names of those who may justly be described as the mainstays of the Institution, that of Ernest Marceau is written large. The present Treasurer of the Canadian Society of Civil Engineers was born at Danville, P.Q., in December, 1852. He mastered the general rudiments of education at the primary school from 1858 to 1866. In the latter year he started upon an eight-year classical course at Montreal College. He entered the Ecole Polytechnique, Montreal, in 1874, graduating with honors in civil engineering in 1877.

In August of the latter year he became identified with the Federal Government as assistant engineer on the Grenville Canal enlargement. Three years later—in 1880—he was made assistant to the superintending engineer of the Ottawa River Canals. In 1893 he was appointed Superintending Engineer of Canals for the Province of Quebec, which position he still holds.

Mr. E. Marceau, Montreal.

Mr. Marceau's connection with the Canadian Society of Civil Engineers dates back to 1887. He has served on the Council of the Society from 1897 to the present date. From Councillor he became Vice-President (1901-1904) and afterwards President (1905). Since 1909 he has been doing excellent service as Treasurer. In 1901 Mr. Marceau was awarded the Gzowski medal for his paper on the Carillon Dam and Slide. He has done some literary work in his younger days and is at present one of the directors of "La Revue Canadienne," Montreal. Since 1900 he has been Principal of the Ecole Polytechnique, Montreal.



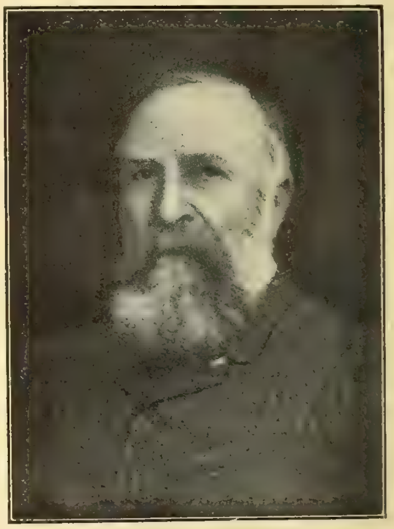
Mr. W. F. Tye, Montreal.

W. F. Tye, Montreal.—Vice-President.

Mr. W. F. Tye, Montreal, who last year was elected a Vice-President of the Society, was born on March 4, 1861, at Haysville, Ont., and was educated at Ottawa University and the School of Practical Science, Toronto. From 1882 to 1885 he was identified with Canadian Pacific Railway construction as rodman, leveller, transitman and assistant engineer. In 1886-1887 he was employed as transitman and assistant engineer on the Great Northern Railway, and in 1888-1889 as engineer of track and bridges on the Mexican Central Railway. During 1890 he was locating engineer for the Great Falls and Canada Railway, a position which he resigned in 1891 to become division engineer on the Great Northern Railway. In this capacity he remained until 1893, when he accepted the position of engineer for the Alberta Railway and Coal Company. Two years later he was appointed chief engineer for the Kaslo and Slocan Railway, B.C., resigning in 1896 to become chief engineer of the Columbia and Western Railway, B.C. In March, 1900, he was appointed chief engineer of construction by the Canadian Pacific Railway, and in May, 1904, chief engineer of the same road. The last named position he resigned in 1906 in order to engage in private practice. At present Mr. Tye devotes his time to the duties incumbent upon him as President of the Sterling Coal Company and the Dominion Graphite Company. He is also a director of the Home and Foreign Securities Company. Mr. Tye takes a keen and unselfish interest in advancing the interests of his profession generally and in particular those of the Canadian Society of Civil Engineers.

Hugh D. Lumsden, Ottawa.—Past President and Hon. Councillor.

Hugh D. Lumsden may quite properly be described as a member of the "old brigade" of the Canadian Society of Civil Engineers, having been a member of its Council as far back as 1887. He was its President in 1906.



Mr. H. D. Lumsden, Ottawa.

Born in Aberdeenshire, Scotland, on September 7, 1844, Mr. Lumsden was educated at Bellview Academy, Aberdeen, and Wimbledon School, Surrey, Eng. He came to Canada in April, 1861, in which year he passed his preliminary examination as Ontario land surveyor. The final examination he took after coming of age. For five or six years he practised as a land surveyor at Woodville, Ont., after which he devoted his attention almost exclusively to railway surveying and construction. About 1870 Mr. Lumsden located a portion of the Toronto and Nipissing Railway (now the G. T. R.) from Eldon to Coboconk. A long line of important engagements followed. Among the various roads with which Mr. Lumsden has been prominently identified, may be mentioned the Toronto, Grey & Bruce Railway, Northern Railway, Credit Valley Railway, Ontario & Quebec Railway, C. N. R., C. P. R., and G. T. R.

In August, 1904, Mr. Lumsden was appointed chief engineer of the Transcontinental Railway, fulfilling the duties of that position until June, 1909.

Professor R. J. Durley, Montreal.

Mr. W. J. Francis, Montreal.

Mr. J. G. Sullivan, Montreal.

J. G. Sullivan, Montreal.—Member of Council.

The Assistant Chief Engineer of the C. P. R., Mr. J. G. Sullivan, Montreal, is a native of Bushnell's Basin, Monroe County, N.Y., having been born at that place on June 11, 1863. From 1884 to 1888 he pursued his studies at Cornell University, from which he graduated with the degree of C.E. Leaving Cornell he entered the service of the Great Northern Railway as rodman. From 1888 to 1890 he was engaged with the Spokane Falls Northern Railway as instrument man and assistant engineer. In the latter year he accepted the post of assistant engineer with the Great Northern Railway, remaining with that company until 1893, when he took a similar position with the Alberta Railway & Coal Company. The following year he was employed as locating engineer for the Butte, Anaconda & Pacific Railway, and in 1895 as principal assistant engineer for the Kaslo & Slocan Railway. In 1896 Mr. Sullivan went into the service of the Columbia & Western Railway as reconnaissance engineer. Two years later he was appointed principal assistant engineer of the same road, resigning in 1900 to become division engineer of construction for the C. P. R. From September, 1905, to January, 1907, Mr. Sullivan was assistant chief engineer on the Panama Canal. In February, 1907, he was appointed manager of construction for the C. P. R., and in September, 1908, assistant chief engineer of the system, the responsible duties of which position he is still fulfilling.

Walter J. Francis, Montreal.—Member of Council.

Walter J. Francis, C.E., of Montreal, a member of the Council of the Canadian Society of Civil Engineers, and one of the best-known consulting engineers in the Dominion, was born at Toronto on January 28, 1872. He is an honor graduate of the School of Practical Science, Toronto (1893), and a member of both the Canadian and American Societies of Civil Engineers. After obtaining his early experience on various engineering works at Toronto, he entered the service of the Grand Trunk Railway in 1894 as assistant engineer to Mr. Edmund Wragge, M. Inst. C.E., on the construction of the Toronto Union Station. After being employed on steel work design and construction for some years, he was engaged by the Department of Railways and Canals to design the 65-foot hydraulic lift locks on the Trent Canal at Peterborough. This position developed into that of principal assistant to the chief engineer of the canal, and included the design and construction of the Kirkfield lift locks. For the description of the hydraulic locks Mr. Francis was awarded in 1906 the Gzowski medal by the Canadian Society of Civil Engineers. In 1906 he left the Government service to take charge of the construction of the 32,000 horsepower plant for the West Kootenay Power and Light Co. at Nelson, B.C., for Messrs. Ross & Holgate. Returning to Montreal on the completion of that work, he took the position of chief engineer and assistant manager of the Dominion Engineering & Construction

Mr. H. H. Vaughan, Montreal.

Mr. C. E. W. Dodwell, Halifax, N. S.

Professor H. E. T. Haultain, Toronto.

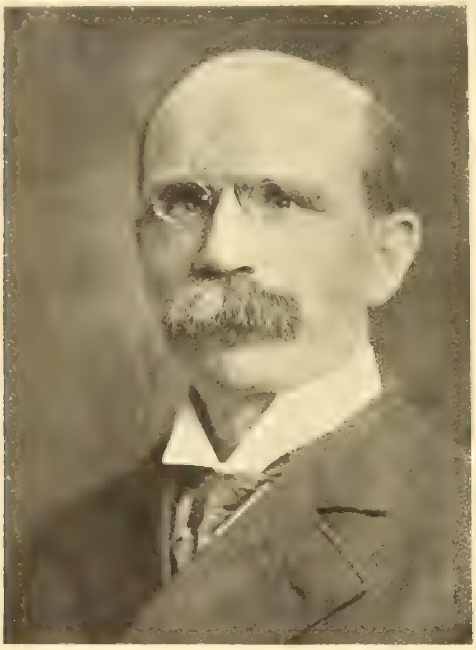
Company, which he resigned at the end of 1907 in order to engage in private engineering practice in Montreal.

Mr. Francis makes a specialty of arbitrations, court work, betterments and reports, and carries on an extensive practice. It will be remembered that his services were retained by the Royal Commission of Inquiry into the Quebec Bridge disaster. As a contributor to the technical press he is widely known. He is Canadian writer for "The Engineer," of London, Eng.

Mr. Francis represents the Canadian Society of Civil Engineers on the committee now revising the building code of the City of Montreal.

C. H. Rust, Toronto.—Vice-President.

Toronto's City Engineer was born in the County of Essex, England, on Christmas Day, 1852. He entered the service of the city in 1877 and was appointed to his present position in February, 1898. Mr. Rust has had an extended connection with the Canadian Society of Civil Engineers. He became a member in 1887 and has served a number of times as Councillor and Vice-President. He is also a member of the American Waterworks Association. In 1902-3 he was President of the American Society of Municipal Improvements. A more detailed sketch of Mr. Rust's career will be found in our issue of August 12, 1908.



City Engineer Rust, Toronto.—Vice President

H. H. Vaughan, Montreal.—Member of Council.

One of the prominent railroad men on the Council is Mr. Henry Hague Vaughan, whose photo is reproduced herewith. He was born Dec. 28, 1868, at Forest Hill, Kent, England, and was educated at Woodford, Essex. From January, 1885, to January, 1887, he pursued his studies at the Department of Applied Science, King's College, London. In January, 1888, he entered upon a three years' apprenticeship at the Nasmyth Wilson & Company's works at Patrocroft, Lancashire, England.

That Mr. Vaughan had no intention of sacrificing the practical to the theoretical is evidenced by many things incidental to his early professional life. From January to June, 1891, he was employed with the M. S. & L. Railway at Gorton, Lancashire, and with the London and South Western Railway at Nine Elms, Middlesex. Coming to the United States in 1891, he entered the service of the Great Northern Railway, St. Paul, Minn., and remained with that company until February, 1898, progressing respectively through the positions of machinist, draughtsman, assistant engineer of tests, and mechanical engineer. He then accepted a position as mechanical engineer with the P. & R. Railway, Reading, Pa., a post he resigned in 1899 to enter upon similar work for the Q. & C. Company, Chicago, Ill., with which concern he remained until March, 1902. At that date he was appointed assistant superintendent of motive power with the L. S. & M. S. Railway, Cleveland, Ohio.

Mr. Vaughan's connection with the Canadian Pacific Railway commenced in February, 1904, when he assumed the responsibilities of Superintendent of Motive Power. Promotion came quickly to Mr. Vaughan, and in November, 1905, he was appointed assistant to the Vice-President at Montreal, the post he now holds.

H. E. T. Haultain, Toronto.—Member of Council.

Professor H. E. T. Haultain, of the Faculty of Applied Science and Engineering, University of Toronto, was born in England, and came to Canada at an early age. He was educated at the Public school at Peterborough, Ont., proceeding later to the School of Practical Science, Toronto, where, in 1889, he graduated in civil engineering. He afterwards took post graduate courses at London and Freiberg. His experience has been wide and varied, and it may be truly said that he has an international reputation, for he has held responsible positions in charge of mining operations in Ireland, Austria, South Africa, the Western States, and various parts of Canada.

Mr. Haultain is a frequent contributor to the technical press and retains a consulting practice in addition to his academical work. The degree of C. E. was conferred upon him by the University of Toronto in 1900. He is an associate member of the Institution of Civil Engineers, a member of the Councils of the Canadian Society of Civil Engineers and of the Canadian Mining Institute, and Corresponding Member of Council of the Institution of Mining and Metallurgy.

Duncan McPherson, Ottawa.—Member of Council.

Duncan MacPherson, Assistant Chief Engineer of the National Transcontinental Railway, was elected to the Council of the Canadian Society of Civil Engineers in the early "nineties." He has always been an active worker in the Society, of which in 1905 he was made Vice-President.

Mr. D. MacPherson, Ottawa.

Mr. MacPherson graduated from the Royal Military College, Kingston, in June, 1880, and in the following year joined the staff of the Canadian Pacific Railway on the construction of that line north of Lake Nipissing. He remained with the company in various capacities on construction and operation until July, 1905. At that time he was division engineer in charge of the maintenance of over 1,500 miles of main line and branches, including building and bridges. This position he occupied for about fifteen years. In

July, 1905, he was appointed Assistant Chief Engineer for the Transcontinental Railway, the position he now holds.

R. W. Leonard, St. Catharines, Ont.—Vice-President.

Reuben Wells Leonard is a native of Brantford, Ont., and a graduate of the Royal Military College, Kingston, winning a silver medal in the class of '83. Since graduating he has followed his profession for the most part in Canada, taking up railway construction, mining, and water power engineering.

For two years following graduation Mr. Leonard was instrument man and engineer in charge of construction on the Canadian Pacific Railway north of Lake Superior. In 1885 he served in the Northwest Rebellion on various staff appointments.

From 1886 to 1890 he was chief engineer for the Cumberland Railway and Coal Company, of Nova Scotia. For the following sixteen years Mr. Leonard has served as engineer and manager of construction on various portions of the Canadian Pacific Railway from Quebec to British Columbia, on the St. Lawrence and Adirondack Railway, on the Rutland Canadian Railway, on the Cape Breton Railway, and as contractor on the Parry Sound Railway.

In water power engineering he has constructed hydro-electric plants at Niagara Falls, Ont., near St. Catharines, Ont., and for the Kaministiquia Power Company at Kakabeka Falls, Ontario.

In 1906 the Coniagas Mines, in which Mr. Leonard has a controlling interest, created no small stir in the mining world, and carried away much of his attention from his civil engineering projects. About this time he built a smelter at Thorold for the refining of silver ores. In 1909 he became actively interested in the copper claims at Bruce Mines, Ont., in which work is being carried on briskly at present.

Mr. Leonard is President and General Manager of the Coniagas Mines, Limited, with its subsidiary enterprises, the Coniagas Reduction Company, at Thorold, and the Redington Rock Drill Company. He is likewise President of the Bruce Mines, Limited. He is Vice-President of the Canadian Society of Civil Engineers, and Vice-President of the Canadian Mining Institute; he is also a Governor of the Kingston School of Mines.

Last spring Mr. Leonard received an appointment to the Board of Governors of the University of Toronto.

J. M. Shanly, Montreal.—Member of Council.

Mr. J. M. Shanly, of Montreal, was born at Waukegan, Ill., on May 7, 1857. He was educated at the Galt Collegiate Institute and the University of Toronto. His early professional experience was obtained in the office of the late Walter Shanly, C.E. In point of experience, Mr. Shanly is eminently qualified, having been chief engineer of the Beauharnois Junction, Montreal and Ottawa. Central Counties, Atlantic and Lake Superior and International of New Brunswick Railways. He was also contractor's engineer on the Great Northern Railway of Canada, while as consulting engineer and expert he has been engaged on a large number of municipal and hydraulic works. Mr. Shanly's office is located at 310 Board of Trade Building, Montreal. He makes a specialty of expert examinations and reports for railways, bridges, water powers and other engineering works. Mr. Shanly is also a member of the American Society of Civil Engineers, but his primary interest is with the Canadian institution in which he holds office.

C. E. W. Dodwell, Halifax, N.S.—Member of Council.

Of the public works engineers of the Dominion of Canada, none has devoted himself more whole-heartedly to the uplifting of his profession and to the improvement of the conditions of Government service, than Mr. C. E. W. Dodwell, of Halifax, resident engineer of the Department of Public Works for Nova Scotia. He has always been particularly active in the Canadian Society of Civil Engineers, having taken part in its formation in 1887. Indeed he was one of the original Montreal committee of [illegible]. Since 1890 he has been elected a member of the Council twelve times, the last occasion being at the Ottawa Convention in 1910. He was Vice-President of the Society in 1904.

Mr. Dodwell is a son of the late Rev. G. B. Dodwell, M.A. (Cantab.), and was born in England in 1853. His early education was received at the New College School, Oxford.

In 1862 Mr. Dodwell came to Canada and entered the Bishops College School, Lennoxville, where he remained until 1866. He pursued his studies at King's College, Windsor, N.S., from 1869 to 1873, graduating B.A., with honors in mathematics and natural science. For four years he was engaged on the location and construction of the Nova Scotian railways, the Western Counties, Nova Scotia Central and Eastern Extension. From 1877 to 1881 he was Assistant Provincial Engineer on railways, bridges, and so on, for the Nova Scotia Government. In the latter year he joined the staff of the Canadian Pacific Railway, upon which his first works were the preliminary surveys and estimates for the St. Lawrence Bridge at Lachine, carried out in January with Mr. G. H. Massy, M.C.S.C.E. Upon the completion of this work he became identified with the construction of the Ontario and Quebec Railway, first in charge of a district north of Belleville, and subsequently in charge of the construction office at Toronto. He was next resident engineer in charge of that portion of the C. P. R. from Montreal to Vaudreuil, comprising 24 miles. Some heavy work was encountered in this section, notably the stone viaduct entering the city, and the bridges—33 spans of steel—over the Ottawa River, at St. Anne's and Vaudreuil. The latter work was the subject of a valuable paper prepared in 1888 by Mr. Dodwell for the Canadian Society of Civil Engineers (Vol. 2, Part 1).

Dr. Louis Herdt, Montreal.

In 1889 Mr. Dodwell resigned his position with the C. P. R. to engage in partnership with Mr. A. L. Hogg, M.I.C.E., M.C.S.C.E. Among the important works with which Mr. Dodwell was connected at this time may be mentioned the waterworks and sewerage systems at Dartmouth, and the waterworks at Amherst, N.S. In 1891 Mr. Dodwell accepted an appointment under the Federal Government as Resident Engineer of the Public Works Department at Halifax, which position he still occupies. He was elected an associate member of the Institution of Civil Engineers in 1881 and was transferred to the class of members in 1891.

L. A. Herdt, Montreal.—Member of Council.

Dr. Louis Herdt, of Montreal, Macdonald Professor of Electrical Engineering at McGill University, was born in France in [illegible]. He came to Canada at an early age and was educated at the Montreal High School. Afterwards he entered McGill University, and in [illegible] graduated in the Department of Mechanical

Engineering. For a short period he was connected with the Laurie Engine Works, after which he went over to Paris and took a course at the Ecole Superieure d'Electricité. Later he studied at the Institute Electrotechnique at Liege, Belgium, from which he graduated with first-class honors in electrical engineering. In 1898 he entered the employ of the Thomas Houston Company, at their Paris works, where he remained for two years as electrical designer.

Returning to Canada in 1900, Dr. Herdt became identified with the Electrical Department of McGill University as demonstrator. In 1907 he was made Associate Professor of the Department, and in 1909, on the resignation of Professor R. B. Owens, was appointed to the Chair of Electrical Engineering.

Despite the responsibility of his academical work, Dr. Herdt is actively concerned with practical engineering. It is of special interest at this time to recall that he is consulting electrical engineer for the large hydro-electric development which the City of Winnipeg is now building at Point du Bois, a development of 60,000 h.p., with a transmission line of 77 miles. This work also embraces the sub-stations and distribution systems in the city in the form of underground conduit construction. Dr. Herdt's work in connection with the electrolysis of water mains in the City of Winnipeg—by the return electric currents of the Winnipeg Street Railway—has been reported upon most extensively by the technical press. In an advisory capacity Dr. Herdt has always been retained at various times by many of the foremost electrical concerns in the country. As the author of many engineering and scientific papers, he has made a wide reputation.

In 1907, at the first meeting of the International Electro-Technical Commission in London, England, Dr. Herdt was the delegate to represent Canada and was a member of the committee which drafted the rules and regulations governing the work of this Commission. He is President of the Canadian Committee of the Commission.

Dr. Herdt has given a great deal of his time and spared no efforts to promote the welfare of the Canadian Society of Civil Engineers, having been President of the electrical section for some years and a member of Council. He is a member of the American Institute of Electrical Engineers, being local Honorary Secretary for Canada for that institution, a member of the Institute of Electrical Engineers, England, and Officier d'Academie, France.

Richard John Durley, Montreal.—Member of Council.

Professor R. J. Durley is chief of the Mechanical Engineering Department of McGill University, Montreal. Born in England, he was educated at Bedford Modern School, at University College, Bristol, and at University College, London, where he had the honor of winning a Gilchrist Scholarship. At a later date he obtained a Whitworth Scholarship, and, on two occasions, was awarded a Miller prize by the Institution of Civil Engineers.

After serving his apprenticeship with Messrs. Earle's Shipbuilding and Engineering Company, Limited, at Hull, England, he entered the firm's technical staff as draughtsman, and obtained a varied experience in the design and installation of marine machinery. He was afterwards appointed Chief Lecturer in Engineering at the Hull Municipal Technical Schools, and then came to Canada as Assistant Professor of Mechanical Engineering in McGill University. In 1899 he was appointed head of the department, succeeding Dr. Nicolson.

During Professor Durley's tenure of his chair his department at the university, like others, has been freely aided by the engineering firms of the Dominion and by the technical departments of the great Canadian railway companies. These have given not only equipment for the college laboratories and workshops, but even more assistance in the form of employment and special apprenticeship facilities for the students.

The author of a well known text book on "Kinematics of Machines," he has also written on a wide range of subjects for technical societies and the technical press.

Professor Durley has made a special study of questions relating to power plant engineering, including heat transmission from central stations, and heat economy in connection with the ventilation and heating of large buildings. He has frequently acted as technical adviser in connection with power installations and heating and ventilating plants.

The disastrous fires in 1907, which destroyed two of the largest buildings of McGill University, rendered a very large expenditure necessary, and Professor Durley took a leading part in the design of the engineering features of the new Engineering and Medical Buildings, which have now been completed and which replace those destroyed. He has also recently designed and supervised the construction of a 1,000 h.p. central heating and power plant for the service of all the university buildings.

Mr, James A. Bell, St. Thomas, Ont.—Councillor

Two years ago the Department of Mines of the Dominion Government entrusted to the Departments of Mining Engineering and of Mechanical Engineering in McGill University the conduct of a series of chemical, industrial and engineering tests of five to ten ton samples of coal sent from all the principal mines of the Dominion. Investigations of the calorific value, chemical composition, suitability for washing, and coking properties, are being made in the Mining Laboratories, while Professor Durley, in the laboratories of the Department of Mechanical Engineering has made a complete series of boiler trials, and has tested each coal for at least 24 hours in a gas producer supplying a 40 h.p. engine. For this laboratory work a special producer had to be designed and built, capable of dealing with the very various types of bituminous and lignitic coals submitted. The results of these tests, about to be published, will afford the first definite information as to the qualities of the fuel resources of the Dominion.

Sir Sandford Fleming, Hon. M., Can. Soc. C. E.

Of the honorary members who attended the convention in Ottawa last year, none was received with greater interest than Sir Sandford Fleming, who celebrated his 84th birthday in the Federal Capital early this month. Sir Sandford was born at Kirkcaldy, Scotland, and came to Canada at the age of 18. Devoting himself to railroad engineering, he built a great part of the Intercolonial Railway and the transcontinental line of the C. P. R., one of the great engineering achievements of the century. It would take too long to enumerate the lesser engineering projects with which he has been identified.

His activities have not been confined exclusively to his profession. For thirty years he was Chancellor of Queen's University, Kingston. As an author he is well known, and in addition he is something of a financier, being director of the C. P. R. and the

Hudson Bay Company, and Honorary President of the Canadian Cement Company.

J. E. Hardman, Montreal.—Member of Council.

Mr. J. E. Hardman, S.B., consulting mining engineer, Montreal, made his début on the Council of the Canadian Society of Civil Engineers at the last annual meeting in Ottawa. He was educated and took his degree as Bachelor of Science at the Institute of Technology in Boston in 1877. From Boston he went direct to Colorado, where he was employed as metallurgist in a silver lead smelter at Leadville, Colorado. In 1880 he was appointed to the United States Geological Survey, and remained with that bureau for one year, at the expiration of which he accepted a position in Canada with the Hibbard Antimony Company, operating mines and furnaces near Lake George, N.B. Here Mr. Hardman succeeded in producing the first metallic antimony ever made in the Dominion of Canada. The product was sold to the Boston Type Foundry and the Meriden, Connecticut, Britannia Works. Upon leaving New Brunswick Mr. Hardman went to the adjoining Province of Nova Scotia, where he engaged in active gold mining and milling on his own account. After some ten or eleven years he was appointed to the chair of Mining and Metallurgy in McGill University (1895-6), but resigned after holding his professorship one year, and opened an office in Montreal as consulting mining engineer. At present he is consulting engineer to the Canada Iron Corporation and the Canadian Exploration Company, as well as President of the Lake Superior Corporation. He is also General Manager of the San Martin Mining Company, Limited, of Mexico.

R. S. Kelsch, Montreal.—Member of Council.

The name of R. S. Kelsch is one of the best known in the Canadian electrical field. Indeed it may be said to be one of international reputation by reason of its owner's wide and varied connections. Mr. R. S. Kelsch is a member of the Council of the Canadian Society of Civil Engineers, a Past President of the Canadian Electrical Association, a member of the Executive Committee of the Engineers' Club, Montreal, and a member of the American Institute of Electrical Engineers and the British Institute of Electrical Engineers.

Mr. R. S. Kelsch, Montreal

From 1880 to 1887 he was engaged in telephone and telegraph work in Chicago, Ill., after which for a ten-year period he occupied the position of general superintendent and chief engineer of the Chicago Arc Light & Power Company. From 1897 to 1903 he fulfilled the duties of general superintendent and chief engineer of the Lachine Rapids Hydraulic and Land Company, Montreal.

In 1903 the property of the latter company was sold to the Montreal Light, Heat and Power Company, who retained Mr. Kelsch as consulting engineer to consolidate their various properties, consisting of the following companies: Montreal Gas Company, Royal Electric Company, Montreal & St. Lawrence Light & Power Company, Imperial Electric Light Company, Lachine Rapids Hydraulic & Land Company, Standard Light & Power Company, Citizens' Light & Power Company, Temple Electric Company.

These companies were operating a great variety of systems, consisting of direct current of 250 and 500 volts, alternating current at all voltages, and several frequencies.

Since 1903 Mr. Kelsch has continued to act as consulting engineer to the Montreal Light, Heat and Power Company, as well as to many other important concerns in this field throughout the Dominion of Canada and the United States. He has a large clientéle amongst commercial corporations using electric power and is regarded with the greatest confidence by the profession.

Comparative Cost of Cantilever and Gravity Retaining Wall

In building a covered platform for the Saco-Pettee Co., at Newton Upper Falls, Mass., it was found necessary to build a retaining wall along one side of the platform to sustain an earth fill 250 ft. long and some 16 ft. deep. The engineers in charge of this work considered both a reinforced concrete wall of cantilever construction and a wall with gravity section and a design for the most economical section of each drawn up.

The following figures give a comparative estimate as to the amount of material and the cost of each wall per lineal foot.

Cantilever Walls.

29.5 cubic ft. (1: 2: 4) concrete at 23c................	$6 79
36.0 square ft. forms at 12c..........................	4 32
95.0 lbs. steel at 3c..................................	2 85
0.85 cubic yd. extra fill at 25c........................	21
Cost per lineal ft. of wall.........................	$14 17

Gravity Wall.

82.0 cubic ft. (1: 3: 6) concrete at 16c................	$13 12
32.0 square ft. forms at 12c..........................	3 84
Cost per lineal ft. of wall.........................	$16 96

Difference in cost per lineal ft. in favor of cantilever wall, $2.79.

As the wall in question was 250 ft. long, a net saving of nearly $700 was effected by using the cantilever wall.—Concrete Engineering.

A reinforced concrete motor boat, 14 feet 9 inches long, has recently been built in Holland. The walls, strengthened by ribs, are only 0.52 inch thick, They were given six coats of waterproofing compound and despite a number of collisions have not leaked.

St. Catharines, Ont., is to be congratulated upon the decision of Steel & Radiation, Limited, to locate in that city. The products of the concern are well known to the building interests, their specialties being hot water boilers and steel products. Mr. S. W. Howard is secretary, and Mr. R. J. Cluff, general manager, of Steel & Radiation.

Quebec Architects' Annual Meeting

Provincial Association's New Officers Satisfactory Reports Submitted — Recommendations for Revision of Building By-Laws

The twentieth annual meeting of the Province of Quebec Architects' Association took place at the Association's rooms on Beaver Hall Square, Montreal, on Thursday, Jan. 12, when the following officers were elected for the ensuing year: President, Mr. C. Rawson Gardiner; 1st Vice-President, Mr. Ludger Lemieux; 2nd Vice-President, Mr. J. P. E. Dusseault; Treasurer, Mr. W. S. Maxwell; Secretary, Mr. J. E. Vanier; Council—Messrs. Jos. Venne, Hugh Vallance, G. A. Monnette, Jos. Perrault, Stevens Haskell. Mr. T. Raymond, the Past President, was elected in virtue of his late office.

The attendance at the business meeting was small, but more members were present in the afternoon, when two papers were read: "Beauty in Architecture," by Prof. Poivert, and "Ornament in Architecture," by Prof. Nobbs.

The Secretary, in reading the report for 1910, said that there were 125 members. Several attempts, he continued, had been made to induce the city of Montreal to revise the Montreal building laws, and it was satisfactory to note that this work had now been started and a committee of experts appointed. Mr. Jos. Venne would represent the Association on this committee. The following items are regarded by the Association as being desirable:

Building lines on all residential streets.
Minimum size for interior courts with no skylights over them.
Regulation of advertising signs.
Extension of fire limits.

In the reorganization of the Montreal building department the Association recommends a staff to consist as follows:

Superintendent in charge of the whole department.
Chief building inspector.
Four assistant building inspectors.
Engineer in charge of steel work and concrete construction.
Two elevator and fire escape inspectors.
Sanitary inspector's staff.
Boiler inspector's staff.
Clerical staff.

As the electrical inspection is now under the supervision of the fire underwriters, it was decided that a certificate from them would protect the city's interests.

An interesting discussion took place on the suggestion that the Association should keep a record of all historic or old buildings of architectural interest in the Province of Quebec, and members were urged to send in copies of photographs or measured drawings of sufficient interest to file. Those who are acquainted with old buildings of a date prior to the middle of last century, were especially asked to communicate with the Secretary. Mr. Venne proposed offering prizes to the architectural students who submitted the best measured drawings of such old buildings, and Mr. W. S. Maxwell thought that photographs of specially interesting buildings might be enlarged and hung on the walls of the Association's rooms.

It is proposed to hold an "Esquisse" competition in which the subject would be drawn en loge, with five hours allowed for its development.

At the last annual meeting it was suggested that travelling scholarships be offered to students of architecture, and it is now intended to ask the members of the Association to subscribe towards the fund for such scholarships, in order to show their own practical interest in the idea before approaching the Government or public for finances.

The sketching club was reported to be very successful; ten out of the fifteen members submitted designs to the Beaux Arts Society of New York, and eight of them were awarded mention. This was placed to the credit of Mr. W. S. Maxwell, who devoted much time and energy to the club as "patron."

The year's receipts totalled $1,820.72, and a balance in the

In the evening a banquet was held at the Engineers' Club.

bank was reported of $2,460.07.

Concrete Siphon Under a High Head

A reinforced concrete siphon has been built across the Albelda Valley, Province of Huesca, Spain, which operates under a maximum head of 98½ ft. It is 2,378 ft. long, 13.12 ft. in inside diameter, and has walls 7.87 in. thick, including an interior mortar coat of 0.6 in. The reinforcement, which is varied from point to point in accordance with the head, consists of longitudinal round rods and circular T-irons, all tied by wire at intersections. Under the maximum head the T's measure approximately 2 x 2 x ¼ in. and are spaced about 3¾ in. apart on centers. The 124 longitudinal rods are each ½ in. in diameter. The concrete was mixed in proportions of 1: 1¼: 2½ and the inside mortar coat in proportions of 1: 1. In order that any leakage might not disturb the foundation of the siphon it was laid in a bed of porous concrete which reached to the horizontal diameter and contained on one side a drainage channel. The upper half of the siphon was covered with loose stone, and the seepage was discharged to the channel through holes in the concrete cover over it, and from the other side of the siphon, through pipes in the foundation. This channel has an outlet to a drainage canal at its lowest point. After a year's service the leakage of the siphon is said to be scarcely perceptible.

British Firm Coming

Messrs. James Wood & Co., manufacturers of builders' supplies, Royal Exchange, Glasgow, propose opening a branch establishment in Canada. For twenty years this firm has been engaged in the South African trade and has had slight dealings with Canadian contractors. They intend, however, to make an effort to obtain the Canadian trade, and for this purpose a member of the firm is now on his way to Canada to arrange for the opening of a branch office which, if results justify it, will quickly be followed by a factory.

Mr. C. Amriault has been appointed assistant engineer to Chief Engineer Janin of Montreal.

Mr. H. S. Hancock, Jr., city engineer of Fort William, has tendered his resignation to the city. He recommends his assistant, Mr. Wilson, for the position.

The double tracking of the C.P.R. from Winnipeg to Brandon, commenced last year, will be completed this summer, giving the company 552 miles of double track west of the great lakes.

The Queen Victoria Niagara Falls Park Commission is planning the construction of a number of experimental roads between Bridgeburg and Niagara-on-the-Lake. The work will be carried out under the supervision of Mr. W. A. MacLean, Provincial Highways Engineer.

Mr. F. A. Yerbury, vice-president and managing-director of the Canadian Boving Company, Limited, will leave shortly for Winnipeg to attend the convention of the Canadian Society of Civil Engineers. Afterwards he will proceed on through Western Canada to British Columbia in the interests of his company. Mr. Yerbury is an associate member of the Institute of Civil Engineers of Great Britain. Among the many leading British concerns for which the Canadian Boving Company are agents may be mentioned Frank Pearn & Company, Manchester, reciprocating pumps; Alley & McLellan, Glasgow, steam engines and air compressors; Mirrlees & Day, Stockport, Diesel oil engines; Heenan & Froude, Manchester, railway rolling stock, equipment, etc.

An Example of Progress from Vancouver

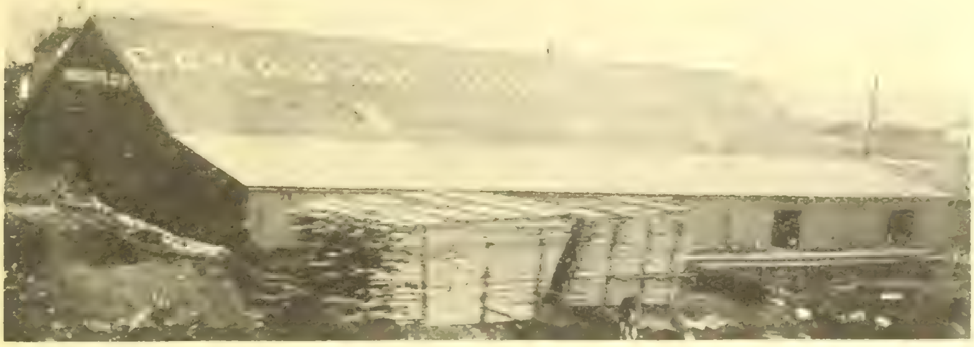
Canadian Pipe Company, Limited, and its Development in Recent Years— Brief Description of Up-to-date New Plant — Some Recent Contracts

Vancouver concerns, like those of most other western cities, are noted for their progressiveness. A notable example is the Canadian Pipe Company, Limited, manufacturers of all kinds of machine wire wound wooden water pipe and iron specials for waterworks systems. The products of this firm have always attracted much favorable attention, and business increased so rapidly during the last few years that it was found necessary to secure a new factory, views of which are shown herewith. The company's new premises are located on Pacific street, one block east of Granville street. The latter thoroughfare is second only in importance to Hastings street, the principal avenue of commerce at Vancouver, and consequently there are excellent facilities for rapid ransportation and easy access. The company's factory, illustrated herewith, is 112 feet by 250 feet, these dimensions giving an area of 28,000 square feet, as compared with 10,000 square feet in the old premises. A complete double line of machinery of the latest improved type has been installed. Each machine has an independent electric motor. Some idea of the excellent arrangement of the company's plant may be obtained from the interior view published herewith. There is a 20-foot driveway through the centre of the factory between the lines of machinery.

We have alluded above to the growing demand for the company's wire wound wooden pipe. It may be interesting to state in this connection that the average daily output of this material from the Canadian Pipe Company's plant is 5,000 lineal feet. Among the many large orders received this season may be mentioned the following: C. P. R., 75,000 feet; City of Revelstoke, 25,000 feet; Summerland municipality, 75,000 feet; City of North Vancouver, 28,000 feet; Raymond, Alta., 35,000 feet; Dauphin, Man., 50,000 feet. A view is shown of a carload of 12-inch diameter pipe consigned to Weyburn, Sask.

The manufacture of continuous wood stave pipe is also a specialty of this plant. The company's product is assembled in place and banded with steel bands. It is generally of larger diameter than can be wound by machinery. Nine thousand feet of 60-inch diameter pipe was built in the Cariboo district this year for the Quesnelle Hydraulic Gold Mining Co.; also about 1,800 feet of 53-inch diameter pipe for the Canadian Pacific Railway for use in connection with their irrigation system near Calgary.

Additional evidences of this company's success are plentiful. In addition to a number of other important contracts, they are now engaged on one approximating $140,000 for the commissioners of the Transcontinental Railway at St. Boniface, Man., installing complete about 4½ miles of 42-inch diameter wooden stave pipe, to be used as a force main for the discharge of sewage. The company's success is attributable to the excellence of the various lines manufactured, to business-like methods and expedition in delivery, and lastly, to the spirit of progressiveness aforementioned.



Canadian Pipe Company's Fine New Factory on Pacific Street, Vancouver

Canadian Pipe Company's Factory — Interior View

A Carload of 12-inch Pipe for Weyburn, Sask.

The Training of the Engineer-Contractor

Functions and Limitations of the College—System, and its Influence on Originality—Value of Experience in Actual Work

Toronto, Jan. 11, 1910.

Editor "Contract Record":

I have read with interest the letter recently published on the above subject by Mr. W. R. Harris and the discussion by Mr. H. Holgate. The question at issue appears to be confined to the amount of practical work that should be taken up in the engineering colleges.

What is the function of the college? Is it to turn out engineers trained in both theory and practice, and equipped with a large fund of useful information? Or is it less utilitarian, and intended to train the mind and develop independence in thought and to equip the student with such implements in the way of science, mathematics, mechanics, etc., as are necessary in working out engineering problems as met in practice? In other words, should the student take up only such subjects as have an immediately seen practical value? Is it how much has been crammed into him, or how he has learned it, and his mental equipment for new and untried fields?

A college cannot think of turning out engineers. It cannot attempt to give the practical side of the work, so that while the young graduate may have learned the theory of design, he is by no means a designer; as he very soon finds out when he takes his first position and is placed at the bottom of the ladder. I believe it is a great mistake for a college to attempt teaching shop work. This can be done better and more economically in a real shop that has to earn dividends. It is feeding students on pap. Let them learn by experience and not depend on being told everything they will have to know. Too much system kills originality. A child never profits by his father's experience.

There are some things that are best learned at college, and others that are best learned in practical work. During the college course it is profitable in more than one sense to take up some engineering work during the vacations. I believe that there are some valuable suggestions in Mr. Harris' letter in the matter of combining the experience of the vacation with the college work. The comparison is a most valuable exercise, and tends to clarify many an obscure theory. Each part of the work should have its due proportion. Don't attempt to build a large structure on another's experience. There is a point, perhaps not readily determined, at which the college part of one's education should give place to the education of life's experience.

The discussion of actual work in the college course might also have a secondary effect in making the professors more practical. No matter how abstruse a subject may be, there is a value in mastering it, but there is greater value in also finding out its application to practical questions. Certainly an engineering course should be a practical one.

Too much must not be expected of the newly-fledged graduate. Don't put a boy at a man's job. At first a student would be of more value on a job if he had given all the time spent at college in outside work, but later on the college training will be more advantageous.

A striking parallel, showing the importance of mental development in the preliminary training of students for research work in science at the universities, is given in an address before the British Association for the Advancement of Science by Principal H. A. Miers, of London. He says:

"I have often heard it asserted that if a boy is capable of taking up at the university a course which is entirely different from his school course, he will generally be found to have come from the classical side and not from the modern side."

Statistics taken at the University of Berlin some years ago showed that the men of classical schooling, in the latter part of their scientific career at the university, outclassed the men whose schooling was scientific. May we not draw a parallel in the case of the college training for the engineering profession?

While it is highly desirable that this training should be as practical as possible, there is a danger of narrowing the vision to the limits in which an engineering specialist is apt to be confined. A man should have an exact knowledge of one subject and a wide and general knowledge of many. Too much cannot be successfully undertaken in the college course. The question of revision of the curriculum might well receive greater attention from the engineering profession than it does.

I believe Mr. Harris' letter contains valuable suggestions on this line, although I think to follow him fully would mean too early specialization.

Yours truly,

A. W. CONNOR.

Wages at St. John, N.B.

St. John, N.B., Jan. 9, 1911.

Editor "Contract Record":

On page 38 of your issue of December 28 last was published a communication headed "Wages and Compensation at St. Johns, N.B." (This refers to St. John, N.B.) I must take exception to the rate of wages submitted by City Engineer Murdoch. We are large employers of labor, and we never think of giving less than $1.40 per day to the commonest laborer. Other skilled mechanics get as much as $5 a day.

Yours very truly,

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Canadian Railroad Development

Ritchie, Ludwig & Ballantyne, Toronto, are to apply to Parliament for permission to build a line of railroad from Toronto to Barrie. The line will probably be operated by electricity.

The Grand Trunk Pacific Railway now has over 2,500 men at work on its grade east of Prince Rupert, B.C. This would indicate that the labor scarcity of last summer has been very much relieved. Sixty per cent. of the grade has been finished from Kitsalas to Hazelton.

The Grand Trunk Pacific Railway system is awaiting the arrival of a shipment of 200,000 cross ties from southern United States ports. A large amount of steel rails have also been contracted for in Sydney, C.B., and that shipment will also be received at the same wharf.

Good progress is being made with the work of clearing the right of way for the branch line of the Temiskaming & Northern Ontario Railway from Kelso to the Porcupine district, and it now looks as though the branch would be completed by July 1. The clearing work is being done by station men.

Steel has been laid on 227 miles of the 400 miles of the National Transcontinental Railway in Quebec now under construction. East of Quebec City 50 miles are completed; 50 miles are complete on the Weymontashene section, which is 197 miles long; 47 miles on the section immediately west of the City of Quebec, and 30 miles of MacDonald and O'Brien's 107-mile contract. M. P. and J. T. Davis have 50 miles ready on their Quebec contract also.

A Grand Trunk Pacific survey party which has spent the season looking over the ground north of Harrison Lake as a route for a railway line into Vancouver, has reached Vancouver. It is understood that the party found the country without insuperable diffi-

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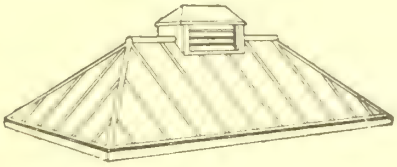

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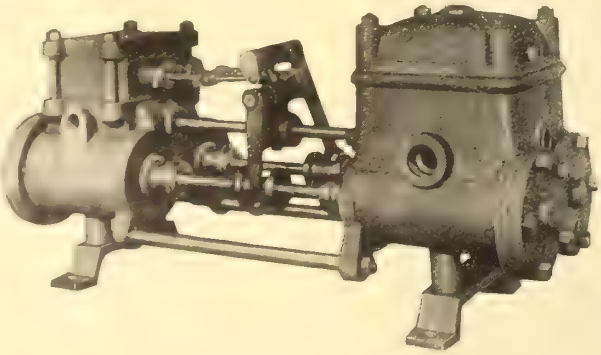

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culties for railway building, and the route is looked upon as a good one. The party was in charge of W. O. Bassett, who was with one of the parties in the field this year doing preliminary work for the proposed line from Fort George to Vancouver. He went in by way of Harrison Hot Springs, and planned to look over 115 miles of country between there and Lillooet, north of which town another survey party was working.

Personal News and Notes

Mr. A. S. Dawson, formerly assistant chief engineer on the C. P. R. irrigation at Calgary, Alta., has been appointed chief engineer.

Mr. A. T. Davidson, of Davidson Brothers, contractors, left Winnipeg recently for Chicago, St. Paul, Minneapolis, New York and other eastern cities.

The City of Ottawa is considering the matter of engaging Mr. W. F. Tye, Montreal, to prepare a report on the entrances of railways into the city.

Cement Age, of New York, and Concrete Engineering, of Cleveland, have been consolidated. Mr. R. W. Lesley becomes editor of the new publication, which will be known as the Cement Age.

Mr. Geo. Lang, A.M.Can.Soc.C.E., and Mr. W. P. Major, A.R.I.B.A., have formed a partnership to carry on a general architectural and engineering practice at Calgary, Alta.

Mr. F. M. Brown has resigned his position as general purchasing agent of the Dominion Steel Corporation to accept the office of general manager and vice-president of the Nova Scotia Car Company, Limited.

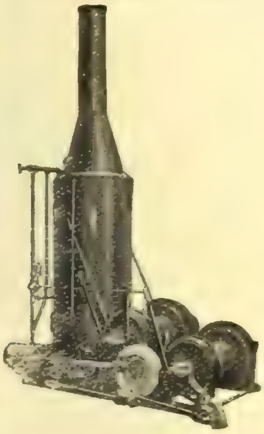
Prince Albert, Sask., has passed a by-law providing for the governing of the city by commission. The commissioners appointed were: Mayor Holmes, City Engineer Creighton, and C. O. Davidson, now City Treasurer. Messrs. Creighton and Davidson will receive $2,700 and $2,000 a year, respectively, for their services.

Mr. R. E. Chadwick, assistant city engineer, in charge of bridges and docks, Toronto, has accepted a position with the Foundation Company, of New York. Mr. E. L. Cousins, who is now in charge of special work and grade separation, and who was formerly resident engineer for the Grand Trunk, will succeed Mr. Chadwick.

The Ottawa Builders' Exchange have sent a letter to the Board of Control of that city, protesting against the manner of calling for tenders for the work to be done at Howick Hall. The Exchange claims that no plans were submitted for the work, and that the specifications were so indefinite that it was impossible for a contractor to tender from them. They are also drawing the attention of the Board of Control to the manner in which previous work has been done without competition. This, they say, is contrary to the city by-laws.

Sydney Cement Company Wins Action

According to a dispatch from Halifax, N.S., judgment has been rendered in the case of Brownley vs. the Sydney Cement Company by the Supreme Court of Nova Scotia reversing the judgment of Mr. Justice Laurence, which was given in favor of the plaintiff. The Sydney Cement Company, which is the only one in Eastern Canada which was not absorbed by the Canada Cement merger, employs foreign flint pebbles in the grinding process incidental to the manufacture of cement, into which specially treated slag from the Dominion Steel works also enters. The plaintiff Brownley shipped a quantity of flint pebbles from France to the Sydney works, and the dispute arose as to their quality and suitability for the work. Judge Laurence decided against the Cement Company, but the case went before the full bench at Halifax, with the result of a decision in favor of the company. The case was commenced over two years ago. The evidence of the plaintiff was taken in Paris and an expert witness was brought from New York.



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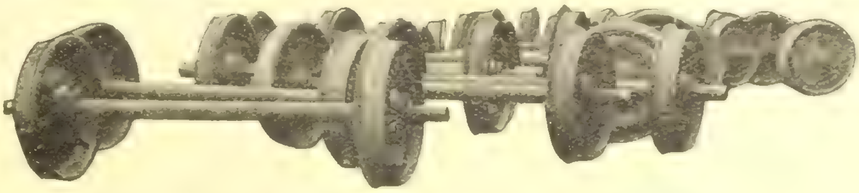

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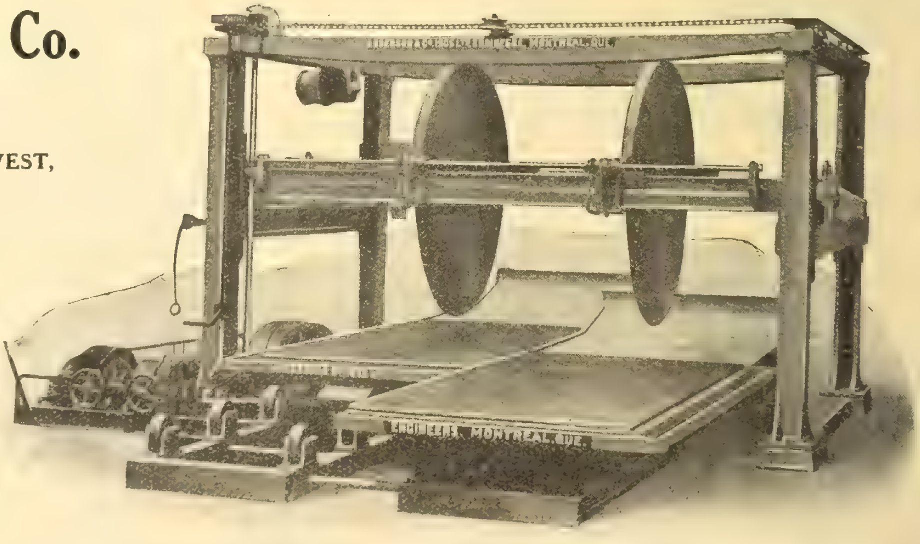

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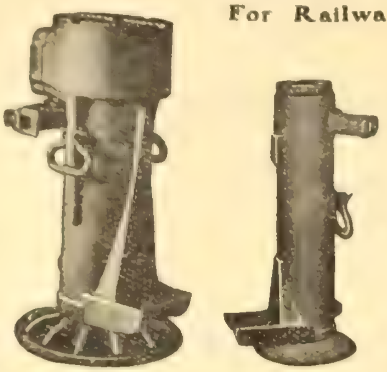

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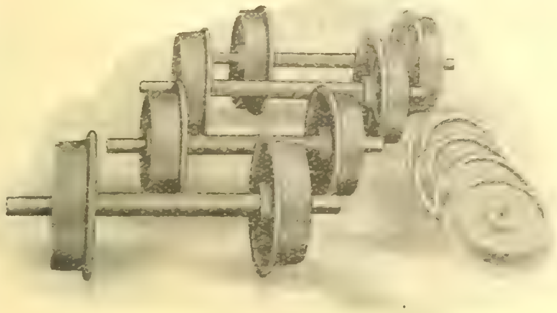

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No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock bricks	10.00
Wire cut bricks for foundation work.. ... ...$10.00 to	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from .... $80.00 to	$150.00

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Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches......	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

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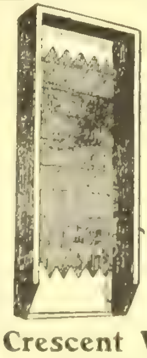
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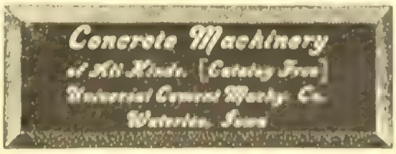

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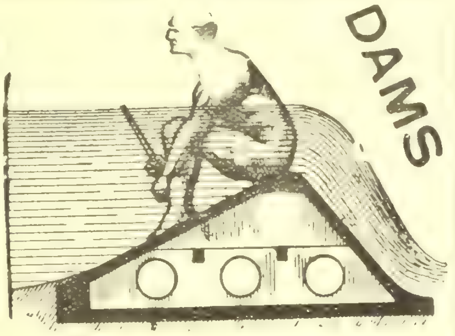

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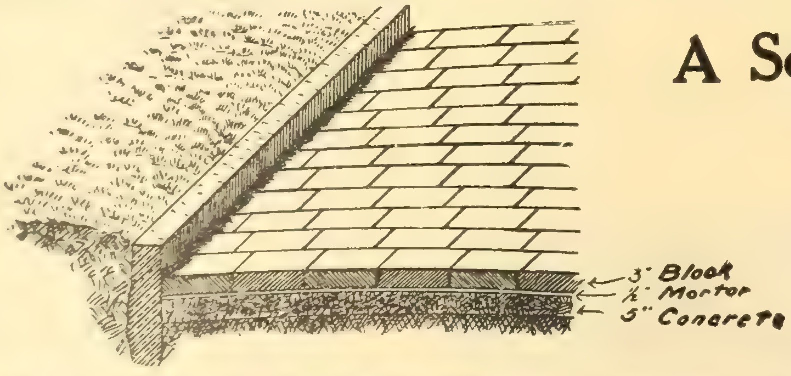

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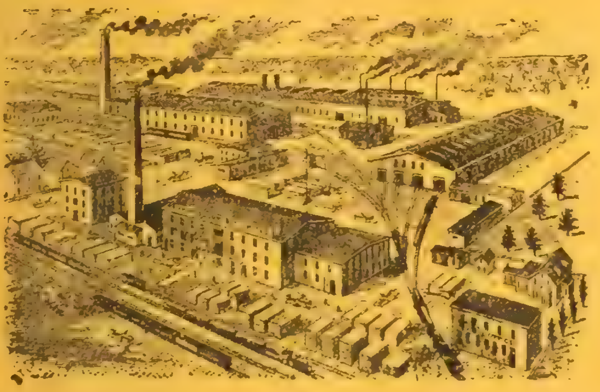

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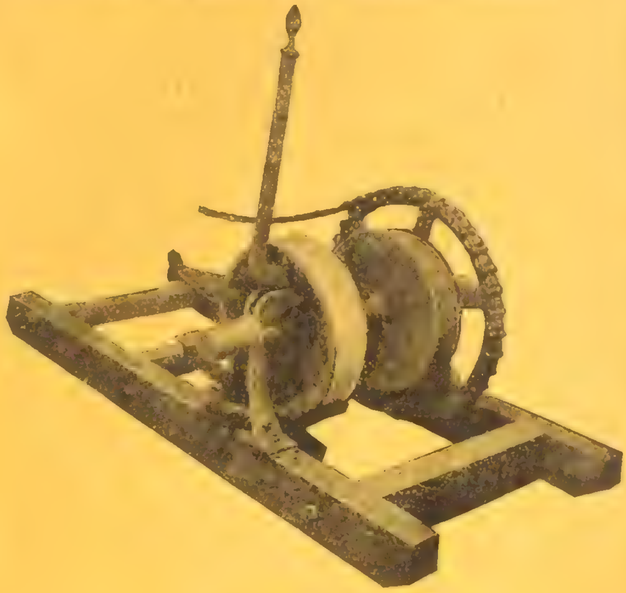

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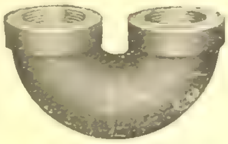
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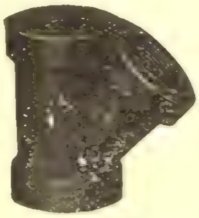
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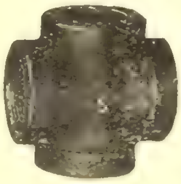
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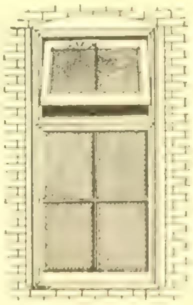

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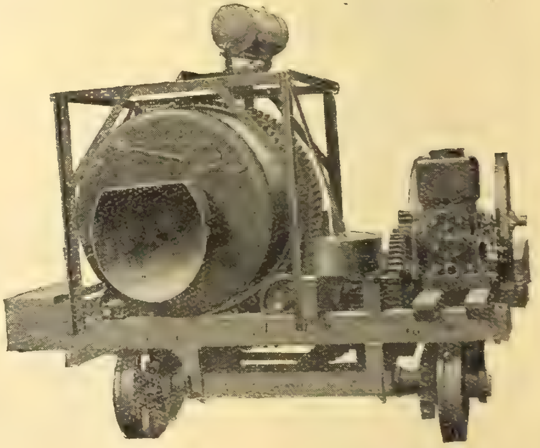

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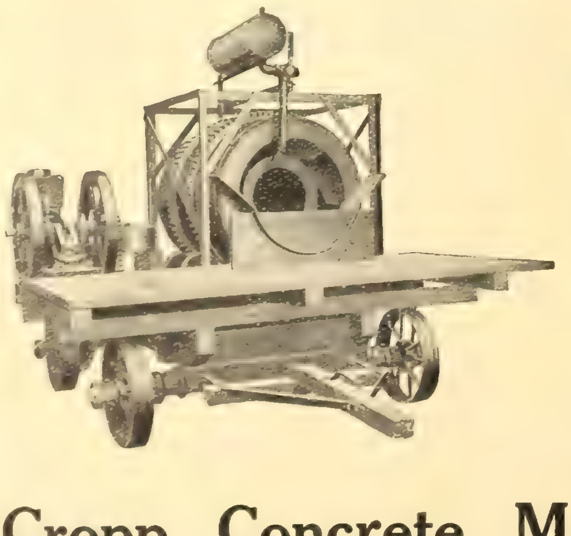

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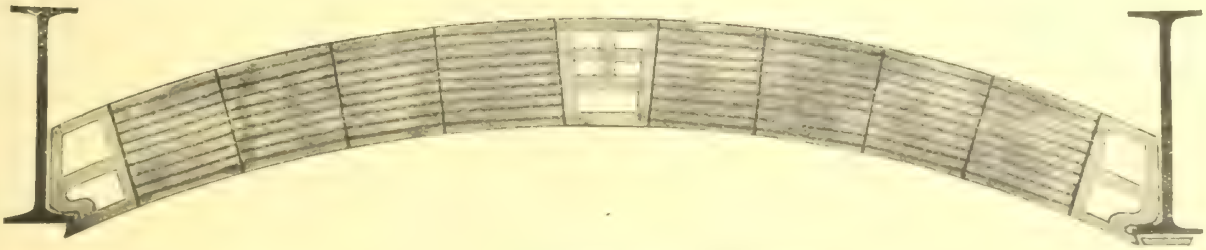

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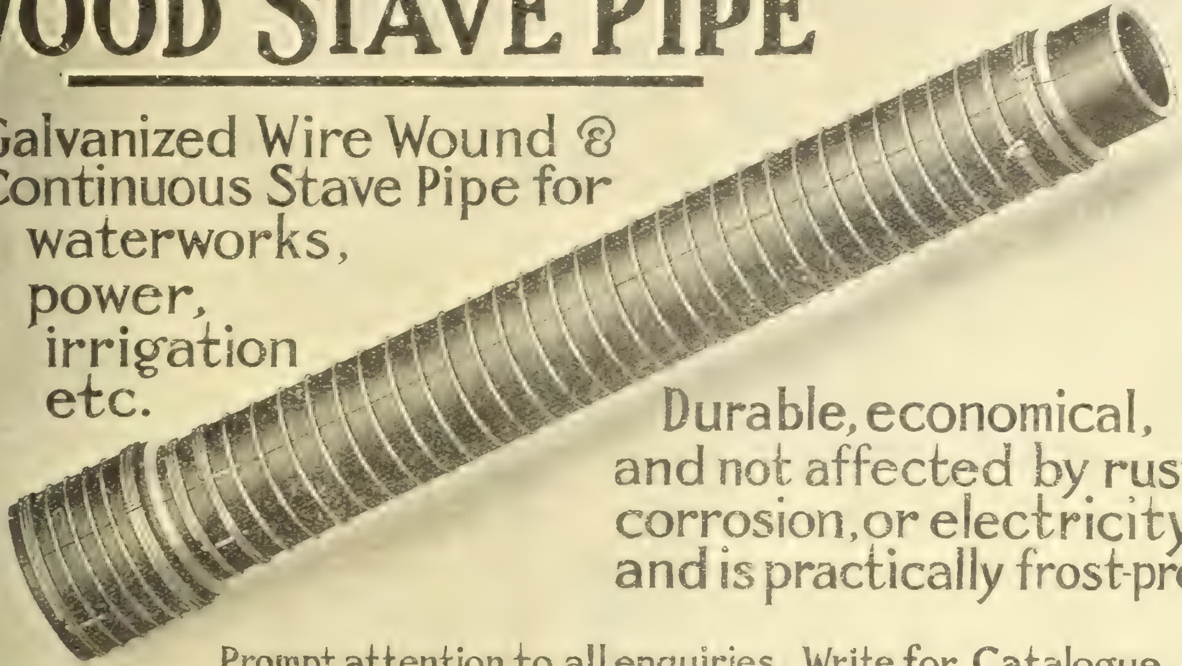

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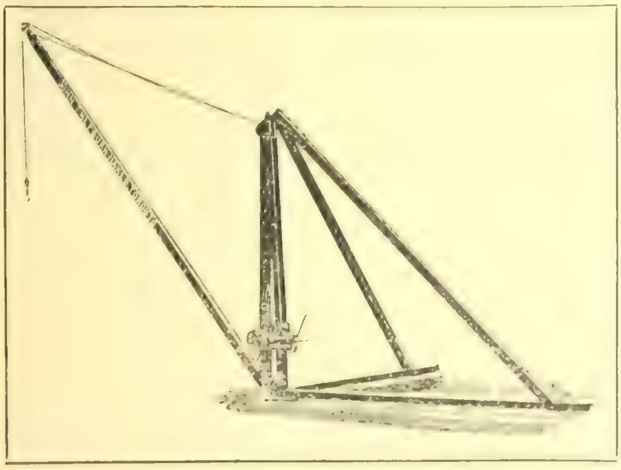

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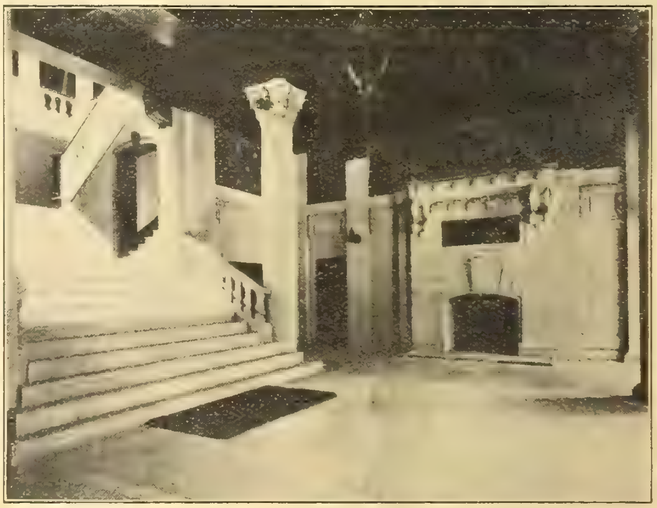

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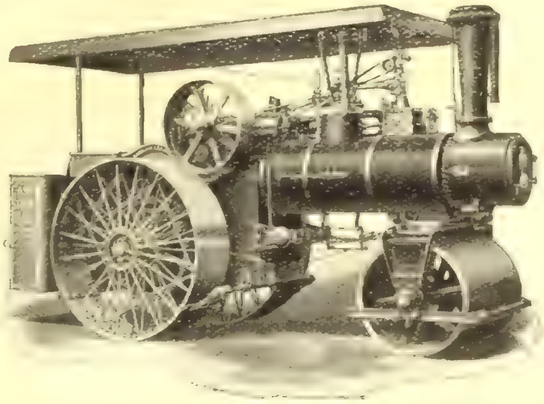

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YOU'LL SAVE MONEY if you do your Road Making with a

"Steel Champion"
Reversible Road Machine

This machine is built to stand, being very substantially constructed of strong material. It does heavy work among roots and stones without any breakdowns which result in loss of time and money.

The many conveniences of this machine are fully described in our catalogue. If you haven't a copy, you should have.

American Road Machine Co.
of Canada, Limited

Goderich, - - Ontario

Designers and builders of road making and contractors' machinery

The Result of Years of Experience

The Level Headed Business Man likes to know that he is buying an article that has proven its worth. Hamilton Vitrified Salt Glazed Sewer Pipe has been sold all over Canada for the past 50 years. In 1910 we sold more Pipe than in any previous year. Surely this is proof positive that

Hamilton Pipe

has met every requirement of the most particular people.

One order is all we ask. You'll need no further urging.

The Hamilton and Toronto Sewer Pipe Co., Ltd.
HAMILTON & TORONTO

Why is a Sewer Pipe?

Round Pipe and Square Dealings

Because

Open Ditches are Out of Date

Why is it that

Vitrified Salt-Glazed Pipe

Are Best for Sewers?

Because

**They are Perfectly Sanitary
and Never Wear Out**

Why are

Mimico Pipe Canada's Best?

Because

Well, Ask Us

The ONTARIO SEWER PIPE COMPANY, Limited
MIMICO, ONTARIO
Telephones:—Toronto Connection, Park 422—Evenings, Park 3888 and 3889

Sewer and Culvert Pipes

We manufacture Highly Glazed and perfectly Vitrified "Standard" and "Double Strength" Sewer Pipes and make a specialty of Double Strength Pipes for Railway Culverts.

We also manufacture Smoke Jacks, Inverts, Wall Coping, Flue Linings (square and round), Chimney Tops, Hollow Building Blocks and all kinds of Vitrified goods.

Fire Clay Goods, Stove and Range Bricks, Boiler Tube Bricks, Locomotive Blocks, and all kinds of "Special Shapes."

The

Standard Drain Pipe Co.

of St. Johns, P. Q., Limited

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Products include

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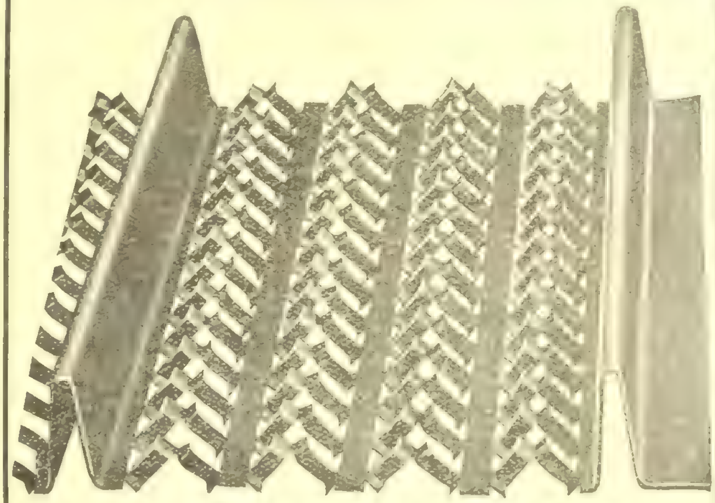

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Head Office:	Branches:	Agencies:
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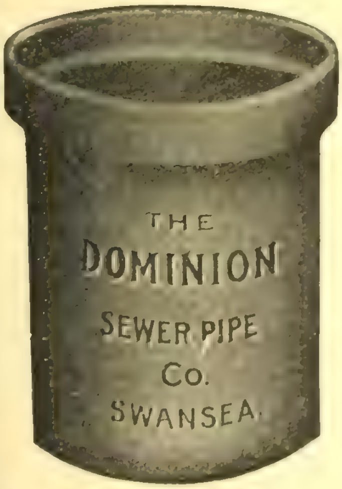
Salt Glazed and Vitrified

SEWER PIPES



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Impervious to Water.

Sizes manufactured and always in stock 4 in. to 24 in.

Ask for Price List and Discounts.

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Inverts

Telephone (Toronto Connection)
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(The Independent Co.) Limited

SWANSEA (near Toronto)

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General Offices: Akron, Ohio, U.S.A.

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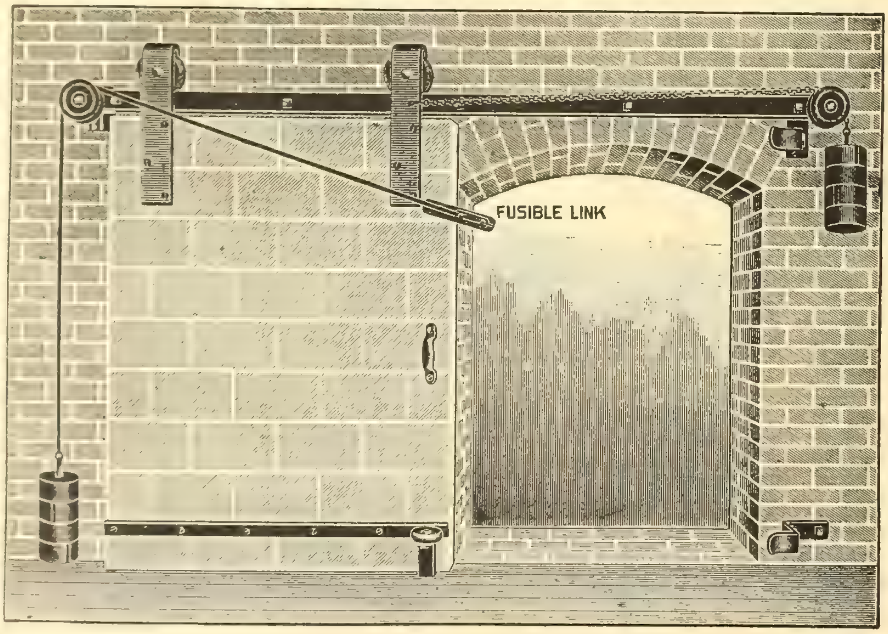

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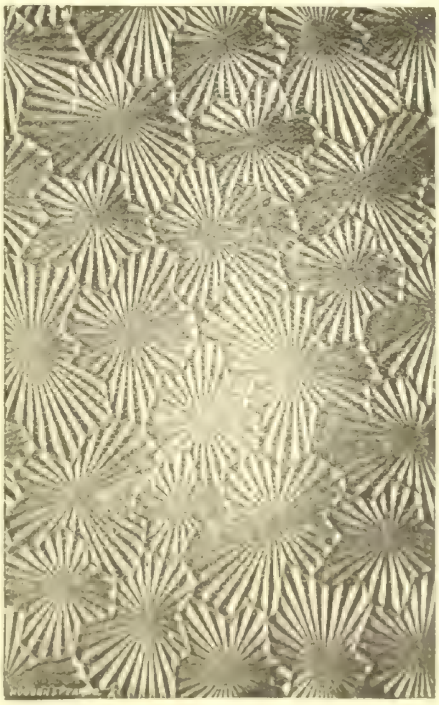

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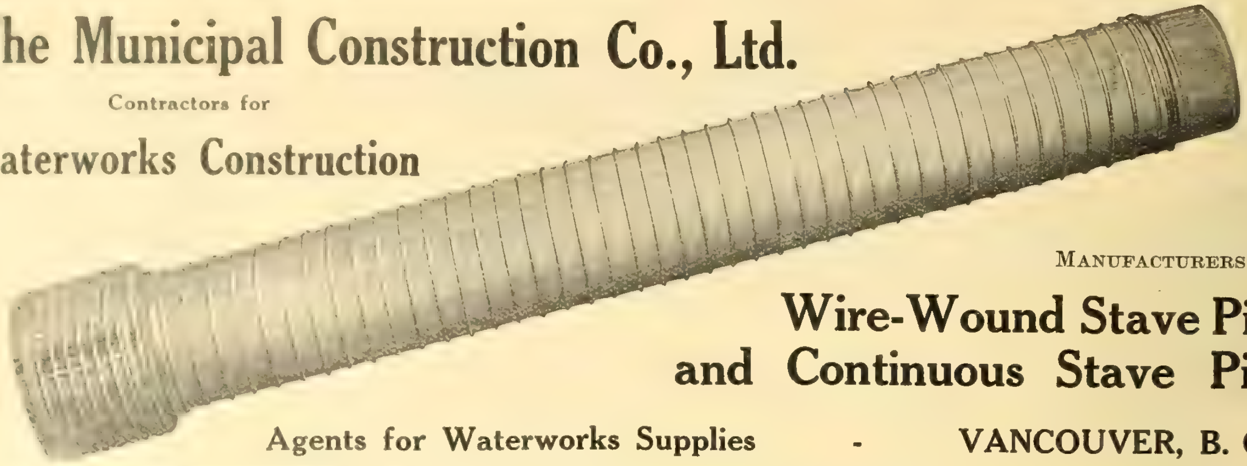

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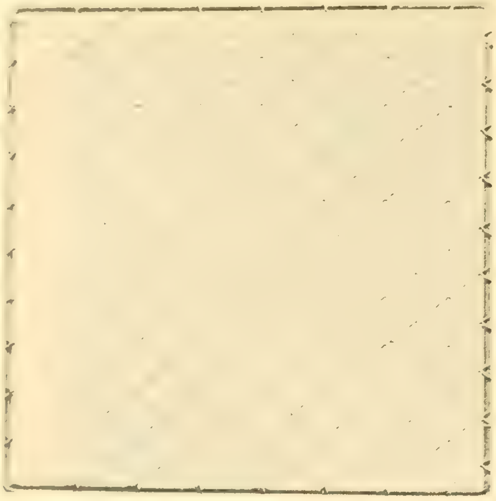

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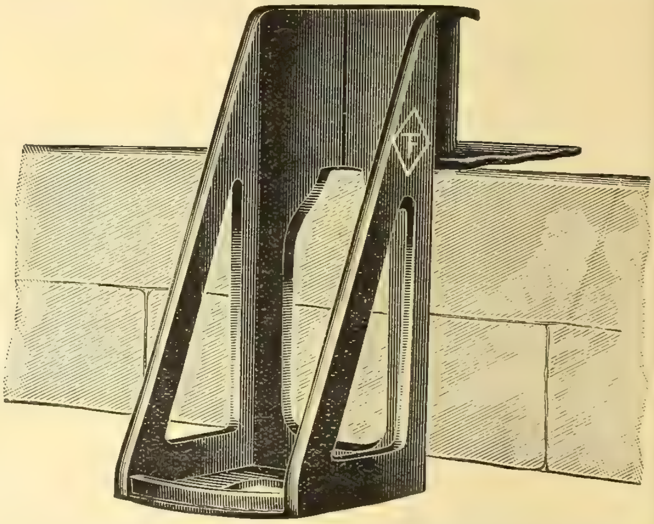

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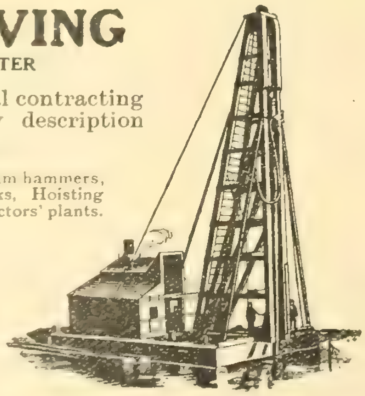

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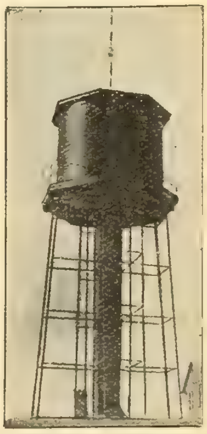

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In 3½ ft. Rolled Units

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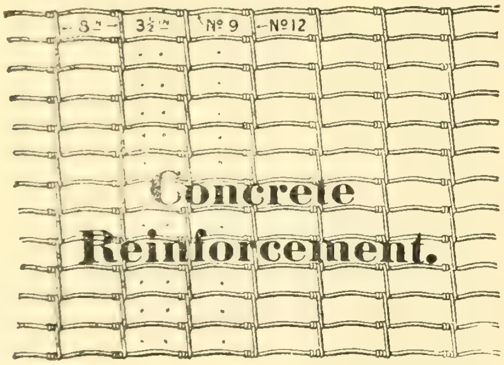

Put up in rolls for easy transportation. Running wires of high carbon steel, not bent or kinked, and of full strength. For adaptable and safe reinforcing of concrete, in dam, retaining wall, and bridge work, factory and foundation work, etc.

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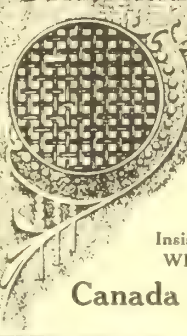

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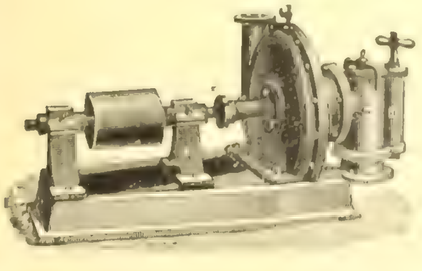

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It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

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is the latest metal lath development. The zinc used in Sherardizing is deposited **within** the steel as well as **upon** it.

Weight for weight the zinc thus used is fifteen times more efficient than the zinc used in hot galvanizing process.

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High and Low Lift

These pumps have attained a world wide reputation for their excellence of design, high efficiency and ability to operate continuously for long periods, and under the severest conditions.

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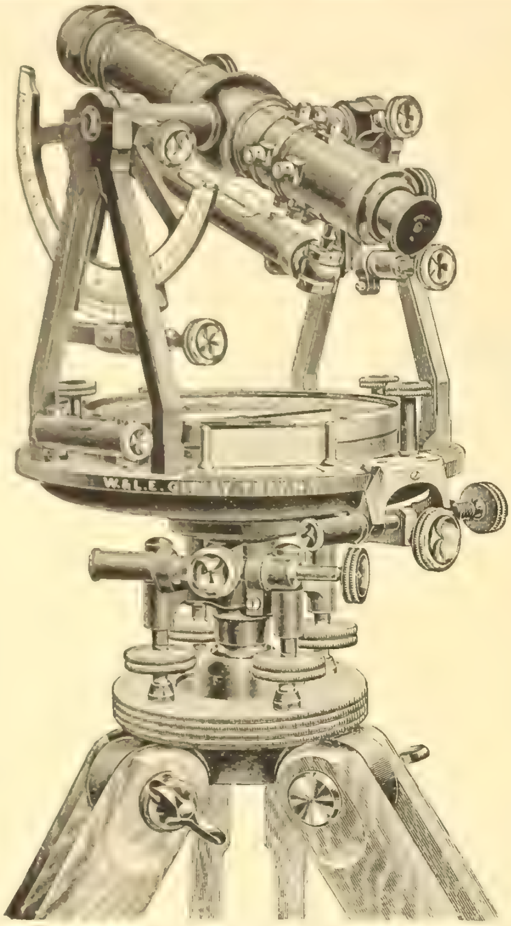

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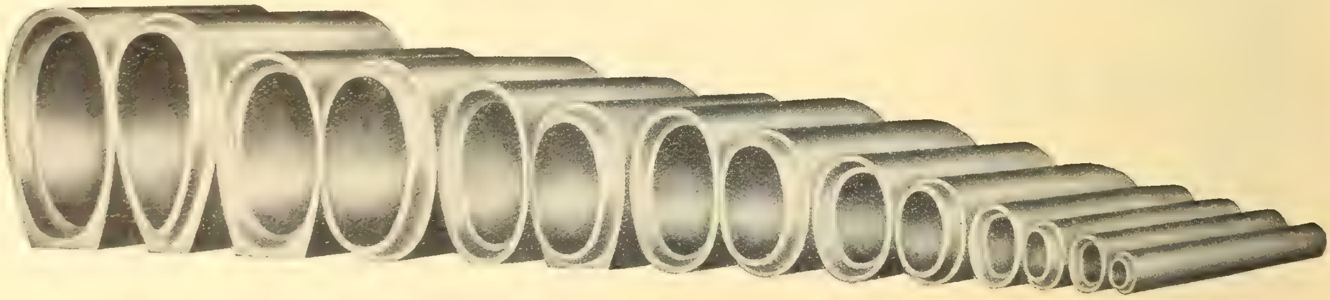

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"Long Service at Low Cost"

Our **Pipe** is **frost-proof, indestructible** and **everlasting.** It is easily handled, easily placed, and easily procured. It has been approved by **most particular, most renowned, most experienced,** and **most skilled engineers.**

Stock sizes 6 inch to 48 inch. Other sizes to order. **Write for catalogue and prices**

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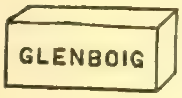

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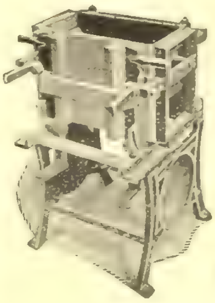

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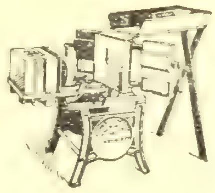

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The MOST COMPLETE EQUIPMENT EVER OFFERED IN ANY HIGH GRADE BLOCK Machine PRICE ONLY $75.00 WHY PAY AN EXHORBITANT PRICE FOR BLOCK MACHINE, making only one width of wall when you can purchase a HIGH-GRADE ADJUSTABLE MACHINE making ALL SIZES AND STYLES of blocks for all widths of walis at a moderate price. OUR MACHINES ARE FULLY COVERED BY PATENTS. WE CAN SAVE YOU MONEY. Write us for full particulars.

We also manufacture London Standard Drum Batch Mixers in five sizes, London Automatic Batch Concrete Mixers in two sizes, Cement Brick Machines, Power Drain Tile Machines, Hand Drain Tile Machines, Silo Curbs, Sewer Pipe Molds, Sill Molds, Ornamental Molds, Cement Working Tools and a full line of Concrete Machinery.

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The kind that don't sag and warp

We have equipped our factory with the latest door making Machinery and are able to turn out doors not only of the best quality but at the right price.

Prompt Deliveries **Write for prices**

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Hardwood Flooring to all others on account of its beautifully smooth finish, perfect manufacture, ease in laying and requiring little or no scraping.

If you are **not** particular about your reputation most any hardwood will do, but "Empire Brand" makes a floor that is a credit to any contractor.

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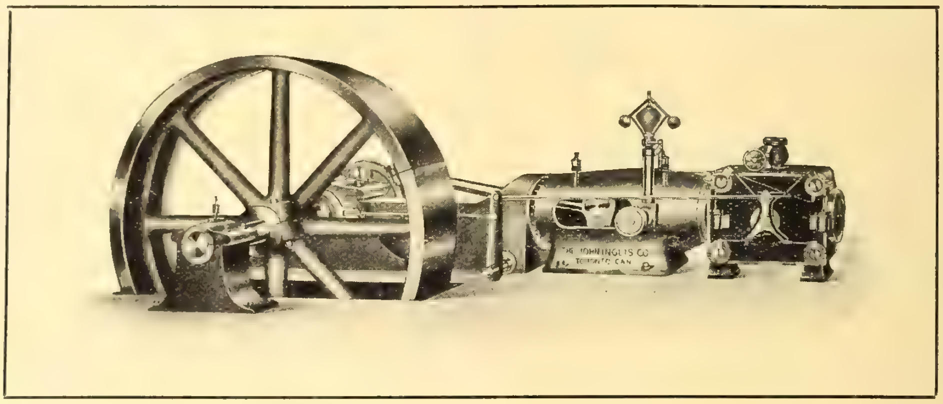
Power——Marine



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Quick Delivery at Right Prices.

Write us

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14 Strachan Avenue - TORONTO, CANADA

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Bowmanville, Ont.
This municipality is considering the installation of waterworks. The proposed source of water supply is from springs seven miles distant. John Lyle, clerk.

Calgary, Alta.
A system of macadamizing streets in the residential portions of the city will be inaugurated this spring.

Camrose, Alta.
The town will install a waterworks system this summer to cost $100,000. Address M. A. Maxwell.

Cowichan Lake, B.C.
We are informed that the installation of small waterworks for household and power supply is still undecided owing to those tendering not being able to give a figure because travelling expenses was not allowed for investigation. T. L. Stamford, C.E., P.O. Box 107 Victoria, and W. G. Winterburn, 566 Bastion Square, Victoria, were among the tenderers. For further information address 722 Colonist office building.

Esquimault, B.C.
Plans have been prepared for a sewer system to cost about $250,000. J. H. Mohun, Victoria, is in charge.

Harrison, Ont.
The expenditure of the $35,000 voted for the purpose of constructing waterworks here is divided as follows; water tower and foundations, $4,100; driven wells, $1,000; pumping station, $1,500; power plant and pump, $6,000; concrete reservoir, $2,000; distribution system, $18,055; real estate, $5,000; engineering and incidentals, $1,845. Herbert J. Bowman, consulting engineer, Toronto; A. J. Stewart, clerk.

Montreal, Que.
Considerable alteration to Victoria Square is contemplated by the Board of Control.

Plans are in course of preparation for the establishment of a sewage farm to enable the city to dispose of its sewage without using the river.

The Board of Control in order to avoid delay, will call for tenders at once for all curbstones that may be required. The same course will be followed in regard to the laying of asphalt and other road work.

A charter has been applied for to incorporate the town of Greenfield Park on the south side of the river in order that the residents, numbering about two hundred, can proceed with the necessary improvements such as sidewalks, sewerage, water, and the building and grading of roads. Mr. W. D. Lighthall is in charge of the legal part of the work

In the details of the scheme for the improvement of the system there are many elements of expense. The report of the waterworks department sums up the items of expenditure as follows:

Construction of the filtration plant		$1,687,000.00
Purchase of extra land necessary for said plant.		318,700.00
Completion of work of enlarging aqueduct now in course of execution		675,000.00
To product 7,000 extra h.p, of which 3,000 to pump 50,000,000 gallons more and 4,000 h.p. for other municipal purposes:		
Enlargement of aqueduct	$1,900,000	
Enlargement of tail race (prop.)	50,000	
Machinery, turbines, pumps, etc.	250,000	
Buildings, foundations, weirs, etc.	100,000	
		$2,300,000 00
		$4,980,700.00

The million and a half that was voted by the City Council is to establish a double filtration plant. It will be capable of filtering fifty million gallons daily. Six acres of filters will be constructed, an dthese basins will be connected with sand washing machines. There will also be included in the plant a sterilization system, and finally a laboratory for the testing of the water. The system will be similar to that of New York.

New Glasgow, N.S.
A conference is to be held shortly in connection with the new water supply of the town of New Glasgow to decide upon the type of pipe to be used, i.e., cement, steel, or wood stave. About seven miles of 16" or 17" pipe will be needed. Mr. C. E. Mitchell, New Glasgow, is the engineer in charge.

Ottawa, Ont.
The City Engineer will shortly call for supplies needed for that department during the year. It is stated that on February 14th tenders will be called by the Board of Control for a large amount of piping, brick, etc

Tenders are called until February 14th for broken stone, brick, stone, curbing cement, plank and cedar, etc. Newton J. Ker, City Engineer. Advertisement in "Tenders and For Sale Department" this issue.

Tenders are called until February 14th for supply and delivery of brasswork, special pipe castings, etc., in connection with waterworks supplies. Newton J. Ker, City Engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Pembroke, Ont.
Tenders are called until February 14th for all labor in connection with laying [illegible] steel intake pipe and the construction of a concrete pump well. Specifications, etc., at offices of T. Aird Murray, Toronto, contracting engineer; J. L. Armour, Pembroke, resident engineer. A. J. Fortier, town clerk. Tenders are also called until same date for labor in connection with laying about 5,900 feet of 16" water main, together with fixing valves and hydrants. Advertisement in "Tenders and For Sale Department" this issue.

Point Grey, B.C.
The ratepayers authorized the expenditure of $350,000 on road improvements.

Porcupine City, Ont.
Plans for sewers and water are already underway by the local officials .

Port Hope, Ont.
This municipality passed the by-law to expend $13,000 for concrete sidewalks. We are informed that contracts will open about May 1st. J. W. Sanders, town clerk.

Strathroy, Ont.
A. McLachlan, Strathroy, is in charge of the work of installing the new engine and pump required by the water commissioners. By-law carried voting $5,000 towards this purpose. Under date of last information the above had not been purchased.

St. Thomas, Ont.
The ratepayers of Ross street, south of Wellington, decided at a meeting recently to advertise for tenders for paving that portion of the street. Tenders will be asked in bulk or in part.

Toronto, Ont.
The city will ask the Ontario Legislature for permission to issue debentures and raise the sum of $626,544 to cover the cost of an additional waterworks intake pipe and new trunk mains, to increase the daily supply.

The City Engineer recommends the construction of the following mains, to relieve the situation, at an estimated cost of $161,544:

Thirty-six inch main from the main pumping station at Front street, and along Front street to Simcoe.

Thirty-six inch main from Wellington along John street, Grange road and Beverley street, to College street.

Twenty-four inch main on Sumach street, from Queen to Wellesley.

Twelve inch main to feed North Rosedale.

Twelve inch main on Wilton avenue from River to Broadview.

Victoria, B.C.
[illegible]

Winnipeg, Man.
Tenders are being called by the Board of Control until March 1st for supply of asphalt for street paving for this city. Plans etc. at office of City Engineer. M. Peterson, secretary. For further infor

mation see advertisement in "Tenders and For Sale Department" this issue.

AWARDED

Pembroke, Ont.

John L. Armour, resident engineer, writes that the contract for supply of 18" intake pipe and 16" water main have been awarded by the Town Council to Messrs. Drummond, McCall & Co., Montreal. T. Aird Murray, consulting engineer.

Winnipeg, Man.

The contract for sewer on Centre street has been awarded to Mr. Newman at $17,000, by Board of Control.

Railroads, Bridges and Wharves

Brantford, Ont.

City Engineer Jones has condemned the Lorne bridge as unfit in its present condition to sarry the proposed line of cars to Port Dover.

Calgary, Alta.

Tenders addressed to N. E. Brooks, divsion engineer, C. P. R., Calgary, will be received until January 31st for erection of timber trestles, including end and central towers over south fork of Old Man River, etc., maximum height, 137 feet, length 650 feet. Material to be furnished by company.

Edmonton, Alta.

A subway will be constructed at Jasper avenue and not a bridge as at first intended. J. G. Sullivan, C. P. R. Engineer, Montreal, Que., will have charge. F. M. C. Crosskill, Secretary-Treasurer, of Edmonton.

Ottawa, Ont.

Tenders addressed to the Chairman of the Board of Control will be received until January 31st for cleaning and painting St. Patrick and Sussex street bridges. Newton J. Ker, City Engineer.

The council have decided to bring the eminent railway engineer, Mr. W. F. Tye, of Montreal, to Ottawa, to report in conjunction with City Engineer Ker on the railway entrance problem. Noted previously.

The Dominon Government will be asked to put $75,000 in the estimates this year as its contribution towards the cost of erecting the high level bridge over the Rideau canal at Bank street. The civic street railway extension committee appointed Ald. Carnochan and Brown and City Engineer Ker as the deputation.

Penticton, B.C.

Penticton and Princeton Boards of Trade will co-operate in the construction of a new scenic route through the Osprey Lake district.

PortArthur, Ont.

It is understood from good authority that the C. P. R. will double track their line between Fort William and Port Arthur at a cost of about $250,000, and that R. Ferguson, general road master, will be put in charge.

St. George de Beauce, Que.

Tenders will be received on or about February 15th at the office of the council at Providence P.O., Beauce, for the construction of an iron and concrete bridge on the Chaudiere river; tenders to be of two kinds, one for the substructure, and the other for the superstructure. Plans, etc., at the office of Mr. Arthur Godbout, East of St. Georges de Beauce; Charles Bolduc, secretary-treasurer, C. N. C. B.

Ste. Famille, Que.

Tenders are called by Public Works, Ottawa, for extension to wharf here until February 20th. Plans, etc., at above department; at the offices of the district engineers in Montreal and Quebec; and on application to local postmaster.

Temiskaming, Que.

Hon. Chas. R. Devlin, of the Quebec Government, Dr. Hodgins, M.P. for Pontias, and others waited upon Mr. Pugsley, Minister of Public Works, to urge an increase in the grant for the construction of a bridge at Temiskaming. The sum of $50,000 is already in the estimates for the bridge here, but the deputation has asked to have this amount increased so that the bridge could be strengthened sufficiently to enable it to be used by the Cobalt and Haileybury tend into the Province of Quebec to the Town of Ville Marie.

AWARDED

Ottawa, Ont.

Michael Carlin & Co. have been awarded the contract for the Vancouver Island section of the C. N. R., $500,000.

Public Buildings, Churches Schools, etc.

Aldergrove, B.C.

The citizens here are feeling the need of a public building.

Amherst, N.S.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until January 25th for electric light fixtures, wiring, etc., in public building here. Plans on application to the caretaker of the building, Mr. J. H. Chapman, Amherst, N.S. Mr. C. E. W. Dodwell, District Engineer, Halifax, N.S., and above Department.

Bracebridge, Ont.

The Oddfellows' Block was destroyed by fire on the 17th inst.

Brantford, Ont.

Messrs. Taylor & Taylor, architects, are preparing plans for an enlargement of Wesley Methodist Church in Eagle Place; also for a new school at Moyle's.

Calgary, Alta.

Architect McElroy will design the new church for St. Paul's Presbyterian congregation. Estimated expenditure, about $37,500. It will be carried only as far as the basement at present.

The present incinerators have been condemned and the medical health officer, E. W. A. Brock, of the health department, has submitted several plans of incinerators to the city commissioners. Eestimated cost, $15,000.

Cardston, Alta.

The plans for the 2½-story hospital are prepared. The Dainty Hospital Company, Lethbridge, are behind the project.

Carleton Place, Ont.

The citizens are again considering the erection of a large rink. Plans, site and some capital have already been secured.

Tenders addressed to D. H. McIntosh, M.D., Chairman Building Committee, will be received until February 15th for erection of Masonic Temple here. Plans, etc., obtained from the above.

It is stated that tenders for erection of new Zion Presbyterian Church will be called shortly. Messrs. Robert McCallum, A. F. Stewart and J. S. Burnie were elected managers. Noted previously.

Collingwood, Ont.

Mr. Wilson, architect, is preparing preliminary plans for the new school for which the ratepayers recently voted $30,000.

Cumberland, B.C.

Mr. Coulson, mine manager, has asked for a citizens' committee to report on the cost of erection and equipment of a Y. M. C. A. here. Dr. Gillespie, chairman; J. Shaw, secretary.

Edmonton, Alta.

At a meeting of the Exhibition directors it was decided to call for competitive plans for the erection of new stock pavilion from members of the Alberta Association of Architects, who reside in Edmonton and Strathcona. Entries of plans close February 15t. President, Campbell.

Tenders addressed to John Stocks, Deputy Minister of Public Works, will be received until January 28th for supply and delivery of (a) hollow terra cotta partition tile and (b) small angles, required in connection with the new Parliament Buildings. Plans, etc., at above Department or at the branch office, Calgary.

Grimsby, Ont.

The public library board received a grant of $8,000 towards the erection of a library building. The site has been obtained and plans are being prepared. Jas. Aitchison, secretary.

Halifax, N.S.

Forty acres, estate of late Dr. Robert Murray, have been purchased by Dalhousie University on which a new building will be erected.

Kingsmill, Ont.

The citizens on January 2nd voted to erect a library.

London, Ont.

Ald. Fichter is chairman of the committee appointed to superintend the construction of new city hall.

Markdale, Ont.

The Public Library Board here have received the offer of $5,000 from the Carnegie Library Fund, providing the town provides a suitable site, etc.

Montreal, Que.

The Calvary Congregational Church have under consideration three or four building sites for their new church. The conditions of sale of the old church leave the congregation in possession until June 1, 1912.

The Engineers' Club Committee has decided to erect a new home. The present building will be removed and a large additon made. The plans have been prepared by Saxe & Archibald and work will be commenced in the early spring. Estimated expenditure. $100,000.

Newcastle, N.B.

The County Council have declined to provide for building a new court house this year; the cost ranging from $27,000 to $40,000.

Ottawa, Ont.

The Exhibition Association Committee have decided to recommend to the City

Council that the new agricultural implement and machinery hall be built this year. The estimated cost is $75,000. President, T. C. Bate, Messrs. John Graham, C. Ross, Geo. May, F. Heney and City Engineer Ker are members of the committee.

The estimates of the Public Works Department passed last week include: In Quebec Fraserville, Armory, $5,000; Grosse Isle; quarantine station, repairs, $7,000, new building, $50,000; Levis, armory, $30,000; Maisonneuve, post office, $19,000; Marieville, public building, $17,000; Megantic, public building, $22,000; Montreal, general post office, enlargements, etc., $140,000; post office, Mile End, enlargement, $5,000; public building, $10,000; new barracks, $100,000; Napierville, public building, $10,000; Quebec—Custom house, $70,000; drill hall extension, $50,000; detention building $50,000; immigration building, $80,000; examining warehouse, $2,000; Quebec Province Immigration buildngs generally, $10,000; Rigaud, public building, $18,000; Roberval, public building, $14,000; Rock Island, public building, $15,000; Shawinigan, public building, $15,000; St. Henri, post office improvements, $7,000; St. Jacques de L'Achigan, public building, $15,000; St. Lambert, public building, $20,000; Three Rivers, new public building, $75,000; Westmount, public building, $50,000.

In Ontario—Athens, public building, $5,000; Brantford, drill hall, $900; Chesley, public buildings, $15,000; Dominion public buildings, repairs, etc., $20,000; Dresden, public buildings, $17,000; Dundas, public building, $15,000; Elora, public building, $14,000; Essex, post office, $14,000; Fergus, public buildng, $14,000; Fort William, public building, enlargement, $8,000; Gananoque, post office, addition, $4,000; Goderich, public building, $8,000; Harrison, public building, $15,000; Kingston, post office, additon, $25,000; Listowel, public building, $18,000; Midland, public building, $10,000; Mitchell, public building, $18,000; Mouut Forest, public building, $18,000.

Sarnia, Ont.

We are informed that the $45,000 granted by last year's council for new school will not be issued in debentures by present council. Therefore the erection of school cannot be carried out for some time. Noted in December 7th.

Tenders are called until January 31st for the masonry, carpentry, plumbing, electrical wiring, painting, etc., required in the remodelling of Devine Street Methodist Sunday School. Plans at Simpson & Carter's store. Geo. Leach, secretary.

Strathcona, Alta.

The Library Board will apply to council for a site for the library building; also to Carnegie Library Committee for grant of $25,000 for the erection of building. Ex-Mayor Duggan, chairman; J. H. McDonald, secretary-treasurer.

St. John, N.B.

Tenders were called until January 25th for heating and plumbing in the extension of the St. John Exchange of the New Brunswick Telephone Company, Limited. G. E. Fairweather, architect, 84 Germain street.

Toronto, Ont.

A central site has been purchased in trust for the establishment of a working girls' home for the Catholic women of Toronto. Mrs. James E. Day, President of the Watch-out Committee of the Catholic Women's Auxilary; Dr. Amyot, Messrs. A. C. Macdonell, M.P., T. P. Phelan are interested.

The Registry Office has been condemned by the Grand Jury in their report on local institutions.

The congregation of Grace Church, Elm street, have decided to sell their edifice and move elsewhere.

It was announced at the annual meeting of the Presbyterian Church that the old property on the Don Mills Road had been sold and a new site on Broadview Avenue purchased. The church will erect a new Sunday school, costing about $25,000, as soon as the weather permits. Rev. P. S. Sinclair, pastor.

Truro, N.S.

Dr. Dunbar and Mr. J. C. B. Olive were appointed as members of the committee nominated to report on the question of the establishment of a public general town and county hospital, the report to be ready for the public meeting during the session of the county council in April next. Noted previously.

Vancouver, B.C.

Permit was granted for the erectiion of moving picture theatre, 2222 Granville street, $6,500. Messrs. Stark & Crossley will erect it.

The Art, Historical and Scientific Association have announced their intention to undertake the erection of a museum building. Secretary, H. J. de Forest.

At a meeting held recently the Women's Club Building Society was definitely organized with the object of building a women's club in this city, and steps will be taken for its incorporation. It is expected that the building will cost about $50,000. Mrs. J. H. MacGill, Mrs. Phillips, secretary-treasurer.

Tenders addressed to the Minister of Public Works, Victoria, will be received until February 2nd for erection of an addition to the Court House here. Specifications, etc., at office of the Provincial Timber Inspector, Vancouver, B.C., and at the Department of Public Works, I. C. Gamble, Public Works Engineer, Parliament Building, Victoria, B.C.

The by-law for expenditure of $115,000 for improvements to exhibition grounds having been carried, an extension to the present grand stand will be constructed; 500 additonal feet will give the needed seating accommodation. Work on the central auditorium will be commenced as soon as tenders have been awarded.

The following are the details of the by-laws which carried (noted in issue of last week): School extensions, providing $572,000 for general building and improvements; school extensions, providing $100,000 for the purchase of sites on the south side of False Creek; school extensions, providing $205,000 for the enlargement of King Edward and Britania High schools; morgue by-law providing $25,000 for erection of public morgue with second story of buildng to be used as analyst's laboratory; fire hall by-law, providing $21,000 for new central fire hall for Mount Pleasant.

Vicotria, B.C.

Mr. C. E. Watkins, architect, has been instructed by the school board to prepare plans for a new three-story high school and submit them to the board.

Winnipeg, Man.

The Provincal Health Board have granted permission to the city to erect a contagious disease hospital.

The board of management of the Old Folks' Home, Middlechurch, have decided upon the building of an annex which will be planned during this year. Mrs. Geo. Bryce, president.

Yorkton, Sask.

The management of the Exhibition Association have decided to direct all their energy towards a large exhibiton in 1912. Recently the board bought an 80 acre site.

Residences

Burk's Falls, Ont.

The building owned by James Mitchell, of Elmsdale, was destroyed by fire recently. Loss, about $4,000.

Wallaceburg, Ont.

Plans are being drawn by Architect S. G. Kisney, Chatham, for a new brick residence for Mrs. S. A. Miller, of Wallaceburg. It will be built in the spring.

Business Buildings and Industrial Plants

Berlin, Ont.

The L. McBrine Company, trunk manufacturers, and the Art Glass Company are planning to construct large additions to their present factories; the Felt Boot and Rubber Manufacturers intend building a box factory.

Brandon, Man.

Elevator No. 1 of the Maple Leaf Milling Company was destroyed by fire on the 19th inst. Loss, about $75,000.

Brantford, Ont.

Press reports state that the Bank of Montreal are considering the erection of a large branch building on their present site. Local manager, Mr. Montizambert; architects, Peden & McLaren, Montreal, Que.

Boynston, Que.

The store belonging to Mrs. Bacheldor was destroyed by fire on the 20th inst. Loss, about $2,000.

Calgary, Alta.

Chas. Webster, secretary, Board of Trade, has received a communication from a large glass manufacturing concern anxious to locate in the west and attracted by the discovery of natural gas in this vicinity.

Carleton Place, Ont.

The Union Bank of Canada have purchased property [illegible] street on which it is said a new [illegible] will be erected. The C. P. R. is reported to be contemplating the erection of a new passenger station here; Findlay Bros. Stove Company also purpose enlarging. G. H. Balfour, Quebec, General Manager, Union Bank.

Fort Frances, Ont.

P. S. Dainerd, superintendent, will superintend the construction of the new saw mill being built by the Shevlin-Clarke Company.

Hamilton, Ont.

The Magee-Walton Ice & Coal Company have building permit for the erection of a corrugated iron ice house on Strachan street. Cost, about $20,000.

The Imperial Bank will, it is stated, erect on their site on James street a new 2-story office.

M. Brennen & Sons, Manufacturing Co., Ltd., this city, are contemplating the erection of a large addition to their sash and door plant during 1911.

Lethbridge, Alta.

The Farmers' Lumber Company has purchased property on which office buildings and lumber sheds will be erected. Whiddington Bros. are in charge of the construction.

Medicine Hat, Alta.

The American Grain Separator Co., of Minneapolis, is looking for a location to establish a branch factory in Canada. This city is being considered. W. L. Searles, sales manager, Medicine Hat.

Mitchell, Ont.

Ford & Murphy, Stratford, have bought 44 feet frontage on Main street and will put up a brick block next summer.

Montreal, Que.

The Canadian Car Corporation is thinking of enlarging its establishment by the erection of a foundry and by completing its unfinished power building at Rockfield.

Plans are now being prepared by the architects, Messrs. Warren and Wetmore, for a first-class modern residential hotel for the Carlton Hotel Company, of Montreal. Contracts will be let about the end of March for the construction of the hotel, which it is expected will be ready by the beginning of May, 1912. Sir Montagu Allen, president; L. W. Just, secretary.

Moose Jaw, Sask.

The publishing plant of the "Daily Times" was destroyed by fire on the 19th inst. Total loss, about $100,000.

Ottawa, Ont.

The corner block on Clarence and Dalhousie streets, occupied by V. Charron, S. L. Tesky and others, was destroyed by fire on the 22nd inst.

A new office is to be constructed at the works of Jas. MacLaren Lumber Company, Buckingham. The Ottawa Stair Works has the contract. J. P. MacLaren, architect.

Donald Fraser will erect a commercial building at the corner of Albert and Slater, with seven stores and twelve apartments.

The R. H. Millar building, 248 Albert street, has been purchased by a syndicate, whose intention is to build two additional stores on the rear extension.

Phoenix, B.C.

The Queen's Hotel here was destroyed by fire on the 15th inst. Owner of building, David Oxley.

Regina, Sask.

Plans for the new Bank of Ottawa building have been prepared. George Burn, General Manager, Ottawa. Work will probably start in the spring. Noted previously.

It is reported that the Regent Company will be re-organized as the Regina Tractor Company. On the guarantee of sufficient capital a new plant costing about $100,000 will be built in the spring. The site has been secured and paid for, it is stated. R. G. Thompson is in charge of re-organization.

Rivers, Man.

J. A. Morden has the contract for the heating and plumbing of the new hotel in Transcona.

Sarnia, Ont.

The new plant being erected for A. H. Diver here will be two storeys in height, 80 x 200 feet, of reinforced concrete. Work will commence in the near future.

St. John, N.B.

The grist mill of the Perth Milling Company, Andover, Victoria County, was destroyed by fire on the 22nd inst. Loss, $8,000.

Three Rivers, Que.

A 40-ton pulp and paper mill is to be erected here by the Union Bag and Paper Company, of Sandy Hill, N.Y.

Toronto, Ont.

Tenders were called until January 23rd for removing stores, Nos. 152 and 154 Yonge street. Messrs. A. R. Denison & Stephen, architects, 20 King street west.

The Ontario Brass Rolling Mills Co. are stated to have tentative plans under considerations for extensive additions to their plant other than those now under construction.

Vancouver, B.C.

Permit was granted to Mr. J. W. Weart, managing director of the Investors' Guarantee Corporation, for the 15-story block, corner of Hastings and Richards streets, $500,000.

The Bank of Vancouver plans to replace its temporary office on Douglas street by a bank building. The present lease runs three years. W. H. Ronald, acting manager.

The British Columbia Telephone Company have awarded the contract for the construction of its new telephone exchange in Kitsilano to Smith & Sherbourne. Total cost, $44,000. Construction is to be commenced at once and it is the intention to have the structure in a completed conditon by May 1.

The Hudson Bay Company have under consideration the enlargement of their stores. In Vancouver it is proposed to erect at the corner of Granville and Georgia streets a 6-story building of steel structure. H. E. Burbridge, sales commissioner, Winnipeg.

Plans were presented for the 5-story warehouse to be erected by Messrs. Walter & E. C. Taylor on Water street at an estimated cost of $25,000.

Mr. William Price, general manager of the Western Steel Corporation, is authority for the statement that the steel plant to be econstructed near Sunbury will be started by April 1st. Jas. A. Moore, president. Noted in last issue.

Plans have been filed by Messrs. Parr & Fee for a twelve-story building to be erected on Granville street for Mr. Dominic Burns,$400,000. The building will be constructed of steel and faced with brick and terra cotta. Excavation work on the 12-foot basement has been practically completed. A great amount of architecural work will adorn the porticos and stuccowork. There will be three passenger elevators and one freight hoist. The structure will be fireproof in construction and will have a ground area of 50 feet by 120 feet.

Victoria, B.C.

It is reported that plans have taken shape for th immediate erection of a 10-story block on the site of the Spencer Building, recently destroyed by fire. The proposed structure will cost about $750,000.

Mr. L. W. Hargraves, architect, is preparing plans for the new 5-story hotel to be erected at the southwest corner of Douglas and Pandora streets for Mr. Lim Bang. Work will start as soon as plans are completed.

Welland, Ont.

The site of three acres for the Canadian Automatic Transportation Company's plant has been purchased. The factory will be of brick and concrete and two storeys high and will be a duplicate of the one in Buffalo. Building plans are ready. B. J. McCormick, Industrial Commissioner. President, W. C. Carr, Buffalo; Secretary-treasurer, Chas. O'Hara Craigie, Toronto.

The deal whereby the Ontario Iron and Steel plant, located here, will become the property of the Canadian Car & Foundry Company, of Montreal, has been closed. It is believed that improvements and additions to the extent of $1,000,000 will be made to the plant by the present owners.

Winnipeg, Man.

The $35,000 building permit taken out by the Hudson Bay Company is for alterations and improvements to the stores buildings in connection with the company's extension plans. Mr. Woodman, architect.

Woodstock, Ont.

The agreement between the Ken Knit Co., Ltd. (to be incorporated) and the city, has been arrived at. In return for civc privileges the company will erect and maintain a factory to cost at least (building and machinery) about $35,000. G. F. Mahon, barrister, of this city, representative of companw. Ald. Welford, chairman of industrial committee.

AWARDED

Hamilton, Ont.

The International Harvester Company has awarded to George E. Mills the contract for the erection of their fine office buildng, $40,000. Work is to be rushed to completion as speedily as possible. The company will do its own excavating. The building will be 100 feet long and 60 feet wide, and will be two stories high, with a basement. The following have sub-contracts: John Poag, carpenter work; Burton and Baldwin, interior finishings; Adam Clark & Sons, plumbing; John E. Riddell, roofing; Stamp & Son, painting; Electrical Supply Co., wiring and fixtures; Hamilton Bridge Co., structural steel work; Canadian Wire Goods Company, lockers, etc.

Toronto, Ont.

The contract for the Porous Terra Cotta fireproofing of the new Hobberlin building, corner Yonge and Richmond streets, has been awarded to R. Bennett, contractor, 347½ Euclid avenue.

Vancouver, B.C.

Mr. S. Olason took out a building permit for a brick block at 549 Richards street, $30,000.

Power Plants, Electricity and Telephones

Edmonton, Alta.

Ex-Mayor May, and M. W. Eager, barrister, Edmonton, are endeavoring to se-

(Continued on page 30)

Tenders and For Sale Department

ROCK CRUSHERS

We have a No. 6 and a No. 5 McCully gyratory type with manganese steel head and concaves, suitable for breaking very hard material. Both are new; never set up. Located New York State. Also a 60-ft. elevator and a 48-in. x 12-ft. McCully screen. Will sell separately. Attractively priced. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

Tenders for

Supply of Asphalt

Sealed tenders, addressed to the Chairman, Board of Control, Winnipeg, Canada, for the supply of from 1,000 to 1,500 tons of Asphalt for street paving for the City of Winnipeg, will be received at the office of the undersigned ur to 11 a.m. on **Wednesday, March 1st, 1911.** Specification and form of tender, together with conditions governing tenders, as prescribed by by-law, may be obtained at the office of the City Engineer, 23 James Avenue, Winnipeg, Canada. The Board reserves the right to reject any or all tenders or to accept any bid which appears advantageous to the city.

M. PETERSON, Secretary.

Board of Control Office,
Dinnipeg, Jan. 19th, 1911. 4-5

Notice To Contractors

Civic Supplies

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, Ottawa, will be received by the Secretary of the Board of Control, City Hall, Ottawa, up to 4 p.m., **Tuesday, February 14th, 1911,** endorsed "Tender for Broken Stone, Brick, Stone Curbing, Stone Setts, Cement, Plank and Cedar, Sand, Vitrified Clap Pipe, Asphalt, Castings, or Hardware," as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, Jan. 21st, 1911. 4-5

Cast Iron Water Pipe

Sealed tenders addressed to the City Clerk, Brandon, Man., endorsed "Tender for Cast Iron Pipe," will be received until 12 o'clock noon on **Friday, the third day of February next,** for from Ten to Twenty Thousand Feet of Six Inch and Four Inch Pipe.

The 6" pipe to be 30 lbs. per foot and 4" pipe 20 lbs. per foot, which must be tested to hydrostatic pressure of 300 lbs.

5,000 feet to be delivered by April the 15th, and the balance not later than the 1st day of June next.

Specifications may be had from the City Engineer's office, Brandon.

The lowest or any tender not necessarily accepted.

ALD. CATER, R. E. SPEAKMAN,
Chairman Waterworks Com. City Engineer.
Brandon, Man., Jan. 18, 1911. 4-5

Notice To Contractors

Water Works Supplies

Sealed tenders, addressed to the Chairman of the Waterworks Committee, City Hall, Ottawa, will be received by registered post only, up to 4 p.m., **Tuesday, February 14th, 1911,** for the supply and delivery of Brasswork, Special Pipe Castings, Hydrants, Cast Iron Pipe, Lead Pipe and Pig Lead, Valves or Oils and Grease as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's Office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.

Ottawa, Jan. 21st, 1911. 4-5

Town of Pembroke, Ontario

Tenders For

Laying and Jointing Water Mains, etc.

Tenders are required to be delivered on or before **Monday, 13th February, 1911,** at 2 o'clock p.m., addressed to Mr. E. A. Dunlop, Chairman of Water Committee, Pembroke.

Tenders to include for all labor, etc., in connection with laying about 5,900 feet of 16 inch water main, together with fixing valves and hydrants.

Forms of Tender may be obtained and specifications and plans examined either at the offices of Mr. T. Aird Murray, 303 Lumsden Building, Toronto, or at the office of the Resident Engineer, Mr. J. L. Armour, Pembroke, on or after the 30th inst.

The right is reserved to reject any or all tenders.

By order,
A. J. PORTIER, Town Clerk,
Pembroke.
T. AIRD MURRAY,
Consulting Engineer,
Toronto, Ont. 4-4

Town of Pembroke, Ontario

Tenders for

Laying and Jointing an Intake Pipe

Tenders are required on or before **Monday, the 13th of February, 1911,** at 2 o'clock p.m., addressed to Mr. E. A. Dunlop, Chairman of Water Committee, Pembroke.

Tender to include for all labor, etc., in connection with laying about 5,400 feet of 18 inch Lap-welded Steel Intake Pipe, and the construction of a Concrete Pump Well.

Forms of Tender may be obtained and Specifications and Plans examined either at the offices of Mr. T. Aird Murray, 303 Lumsden Building, Toronto, or at the office of the Resident Engineer, Mr. J. L. Armour, Pembroke, on or after the 30th inst.

The right is reserved to reject any or all tenders.

By order,
A. J. FORTIER, Town Clerk,
Pembroke.
T. AIRD MURRAY,
Consulting Engineer,
Toronto, Ont. 4-4

DREDGES FOR SALE

A one yard Beatty dredge in first-class shape, within a few miles of railroad station, suitable for dredging or ditching; also a half yard machine with portable oak hull in first-class shape. Apply FRED. A. ROBERTSON, Cornwall, Ont.

City of Strathcona
(Alberta)

Tenders for

Engine, Boilers and Generators

Tenders addressed to David Ewing, Chief Engineer power house, Strathcona, Alta., for the above machinery, will be received until noon, Wednesday, March 1st, 1911. Specifications may be obtained upon application to the undersigned.

A. J. McLEAN,
City Engineer.

Strathcona, Alta., Jan. 16, 1911. 4-8

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

WANTED—Position as superintendent or general foreman, railroad work preferred. Twenty years experienced. Address, Box 189, Contract Record, Toronto, Ont. 3-4

ARCHITECT, highest qualifications and experience, would take charge of office or consider partnership. The West preferred. Box 200, Contract Record, Toronto, Ont. 4-7

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

AGENTS WANTED—Large United States Terra Cotta company desires high-class agencies for Canada. Send particulars to W. D. Ward, Tribune Building, New York City.

THE STEEL SQUARE—For sale—4 copies of vol. 1 and 2 copies of vol. 2 Fred T. Hodgson's book, "Practical Treatise on the Steel Square." 242 pages. Price, only 50 cents a copy. Contract Record, 220 King street west, Toronto, Ont.

REPRESENTATIVES WANTED—[illegible] firm manufacturing complete line of electrical measuring instruments want responsible representatives to handle their lines throughout the whole of Canada. Are prepared to deal separate [illegible] Contract Record, Toronto, Ont.

REPRESENTATIVE WANTED IN CANADA—British firm of electrical and mechanical engineers manufacturing electric lighting special[illegible] sentatives who will carry a stock in Canada. Write [illegible] Contract Record, Toronto, Ont. 4-5

The Vice President and General Manager of the Monterrey Railway, Light and Power Company, Limited, Apartado (P.O. Box 58), Monterrey, N.L., Mexico, will receive tenders until March 1st 1911, for erection of gas plant. Plans, etc., at office of the above.

Power Plants, Electricity and Telephones

(Continued from page 28)

cure rights from the Dominion Government to build a dam on the upper Saskatchewan above Edmonton, for the purpose of developing hydro-electric power for the supply of Edmonton and towns in the vicinity.

One of the features of the Provincal Telephone Department for this year will be the strengthening of the long distance lines between Edmonton, Calgary and Lethbridge with new copper wire. There will also be a number of new exchanges and the remodelling of old exchanges. John Stocks, Deputy Minister.

Two important extensions of government telegraph lines into the north country are being planned for this year. One will carry the line northeast along the Athabasca river, to Fort McMurray, a distance of about 200 miles. The other will be down into Grande Prairie from Peace River crossing to where the line was extended last year. Construction of these extensions will probably be commenced on the opening of spring.

Guelph, Ont.

The Light and Heat Commission submitted a plan for new lighting system in which is suggested the placing of two large arcs and a cluster at the street corners in central section and the lighting of balance of city with 800 75 c.p. lights. Mr. Carter, chairman.

Hamilton, Ont.

Steps are being taken to operate the east end sewage disposal works by Hydro power. The return power line from the beach pumping plant to the disposal plant has not yet been built, and that work will have to be undertaken very soon. City Engineer Macallum.

Ottawa, Ont.

The municipal electrical commission is having plans prepared to place all the wires on Sparks street underground. Superintendent, Brown.

Regina, Sask.

The council has instructed the commissioners to meet the Government officials in regard to the steps necessary to the establishment of a municipally owned gas plant.

Tenders marked "Tenders for Street Railway Materials D," addressed to the City Commissioners, will be received until January 31st for supply of trolley poles and railway ties. Particulars upon application to City Engineer, L. A. Thornton.

The Street Railway Commissioners recommended the award of supply as follows: For the overhead work and other equipment:Northern Electric Company—Straight line hangers, $42 each; line ears, $26.90 each; double curve hangers. $56.20, and single curve hangers, $35.20 each; strain plates, $33 each; strain ears, $37 each; left hand trolley frogs; $270 each; right hand trolley frogs, $270 each; crossovers, $410 each.

Dawson and Company—Wood insulators. $23 each; splicing, $54; eye bolts, nine inch, $9.30 each; 10 inch, $9.80, 11 inch, $11.20, 12 inch, $11 each.

General Electric Company — Turnbuckles, $65 each, and lightning arresters, $400 each.

In almost every instance the lowest prices were recommended. The equipment already decided upon by the city engineer and city commissioners does not constitute all that will be required.

The United States Steel Products Company have practically been selected to supply all rails, spikes and bolts necessary at a total cost of $47,409.90. Of that amount $46,846.90 is for rails. The tenders for the rails required very little attention as the American firm was pracitcally alone in the field in that respect.

Strathcona, Alta.

At a meeting of council the recommendation of the fire and light committee, based on the information of Electrical Engineer Ewing as to the inefficiency of the power plant (noted in issue of December 28th) that equipment to the value of about $72,000 be purchased at once, was adopted. The details of this expenditure was given as follows: 600 k.w. generator, $14,300; accompanying engine, about $20,000; necessary boilers, $32,000; provision to be made later for the installation of an exhaust steam turbine engine which would increase the capacity 400 k.w. Chairman Richards stated no time would be lost in securing tenders for machinery supply.

Victoria, B.C.

The electric lighting by-law ($25,000) was carried; also the underground telephone by-law.

Winnipeg, Man.

Pratt & Ross, Architects, have prepared plans for a turbine power house for the Winnipeg Electric Co., to be erected here at a cost of $72,000. Wilford Phillips, General Superintendent.

AWARDED

Ottawa, Ont.

The contract for the additional poles required for extending the "white way" to Rideau and Bank streets was awarded to the Canada Foundry.

Miscellaneous

Edmonton, Alta.

The Fire Department estimates for expenditure for 1911 provide for the purchase of a motor driven chemical and hose combination wagon with a capacity of 50 gallons of chemical, estimated to cost $6,500.

In the estimates for equipment provision will be made also for an aerial ladder truck with 75 feet extension ladder, wall ladders and other equipment, the whole to be horse drawn. This will cost $6,000.

3,000 feet of cotton rubber lined hose will cost $3,300. The total capital expenditure for the year is estimated at $25,085.75. This will include $1,000 for the purchase of sites for future substations. Chief, Davidson.

Toronto, Ont.

Tenders are being called until January 31 by the Board of Control for supply of travelling crane. G. R. Geary, chairman, Board of Control.

Recent building permits include: W. E. Mackey, 2 pair semi-detached 2½-story brick dwellings, 91-97 Wright avenue, $10,000; Fairbanks-Morse Canadian Manufacturing Co., 1-story brick and steel addition to foundry, 1369 Bloor street west, $13,800; 2-story brick foundry cleaning and pattern house, 1469 Bloor street west, $7,000; 1-story stucco storage shed, 1363 Bloor street west, $5,000; Jos. Lavvie, 1 pair semi-detached 2-story brick dwellings, 35-37 St. Clarens avenue, $4,000; H. S. Mara, 1 pair semi-detached 2-story brick dwellings, Ritchie avenue, $4,000; D. Schwalm, 2-story brick dwelling, St. Clair avenue, $4,000; T. J. Bowen, 3 attached 2-story brick stores and dwellings, on south side Dundas street, $9,000; Canadian Pacific Railway Co., 1-story brick repair shop on west side Keele street, $20,000; E. B. Shuttleworth, 1-story brick additon to warehouse on southeast corner Victoria and Wilton, $7,000; T. J. Sharp, 1 pair semi-detached 3-story brick stores and dwellings on east side Roncesvalles avenue, $7,000; John Logan, 3 1-story brick kilns, north of G. T. R. on east side Greenwood avenue, $7,500; Dundas Building Co., 1 pair semi-detached 2-story brick dwellings on east side Murray street, $7,000; Mary C. Horrocks, 1 pair semi-detached 2-story brick dwellings on south side Winchester street, $5,500; H. J. Rae, 2-story and attic brick dwelling, near Summerhill avenue, east side Glen road, $4,500; Virginia Cassevoi, 1 pair semi-detached 2-story brick dwellings on 17-19 Ritchie avenue, $4,500; H. Gingrass, 1 pair semi-detached 2-story brick dwellings on 8-10 Spencer avenue, $4,000; D. E. Moore, 1 pair semi-detached 2-story brick dwellings, near Harriett on Leslie street, $4,000; Fred Holt, 2-story and attic brick dwelling, near Heath on Dunvegan, $8,000.

Vancouver, B.C.

Permits were granted as follows: Provincial Land & Fire Corporation, seven residences, Trafalgar Road, $18,400; J. Chisholm, 2021 Bismark street, $2,110; M. Lothian, 56 Eighth avenue east, $3,000. S. B. Wood, 975 Tenth avenue west, $6,000; P. Duffy, 1036 Thirteenth avenue east, $2,000; Mrs. Ward, 752 Richards street, $5,000; P. Watson, 1218 Fourteenth avenue east, $3,600; D. B. Carmichael, 1035 Barnard street, $2,100; F. Wallace, 1549 Charles street, $2,800; Jefferson & Clapham, 1256 Eighth avenue, $2,700; John Coleman, 1363 Fourteenth avenue east, $2,500; J. Morley, 2535 Sixth avenue west, $2,500; moving-picture theatre at 2222 Granville street, for Messrs. Stark & Crossley, $6,500.

Victoria, B.C.

Building permits were issued as follows: Mrs. J. Handley for a dwelling on Queen's avenue, $2,375; John C. Carling, dwelling on Fell street, $3,000; to David Spencer, alterations to the Driard hotel, $2,000.

Winnipeg, Man.

Recent building permits include: Lyall-Mitchell Company, warehouse, corner Wall and Richard streets, $11,000; D. Johnson, house, north side of Elmwood avenue, $2,000; A. Kolbe, house, between Powers and Andres, $2,000.

Tenders addressed to M. Peterson, secretary, Board of Control, will be received until February 1, 1911, for the supply of labor and material required in the erection of three gateways on Cornish avenue, Armstrong's point. Specifications at office of City Engineer.

AWARDED

Prince Rupert, B.C.

The contract for a new marine depot at Prince Rupert has been awarded to the Pacific Construction Company of Victoria, $150,000.

Contractors' and Builders' Supplies

Crushed Stone

For Concrete Fireproof Construction, Roadwork and Sidewalks

Rubble, Portland Cement

CRUSHED GRANITE for Floors and Sidewalks
SEWER PIPE WEEPING TILE
FIRE BRICK FIRE CLAY

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We are exclusive Distributing Agents for this high grade, hand-made fire brick. Large stock always on hand.

Don't forget our Prompt Delivery Service.

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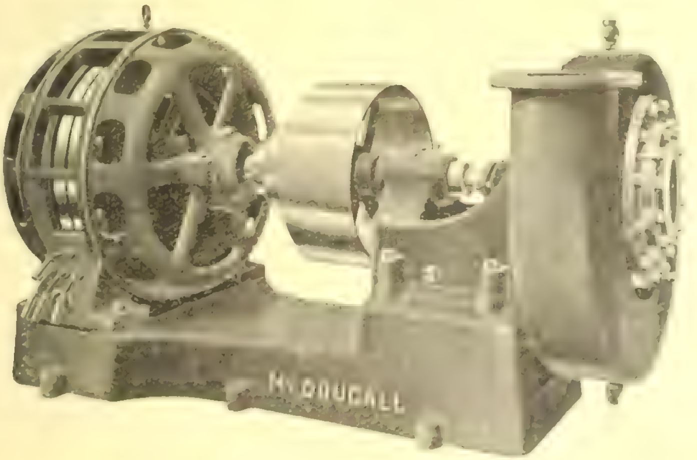
Sand Dredging Pumps



THE VOLUTE PUMP, HERE SHOWN, IS SPECIALLY DESIGNED TO CARRY A HEAVY PERCENTAGE OF SAND. IT HAS A CAPACITY OF 2,334 IMPERIAL GALLONS PER MINUTE, AND IS ARRANGED FOR EITHER MOTOR OR BELT DRIVE. WE BUILD THESE PUMPS OF ALL CAPACITIES AND OF THE HIGHEST EFFICIENCY.

OUR NEW BULLETIN NO. 106, SHOWING MANY APPLICATIONS OF THESE PUMPS, WILL BE SENT ON APPLICATION TO OUR SALES OFFICES.

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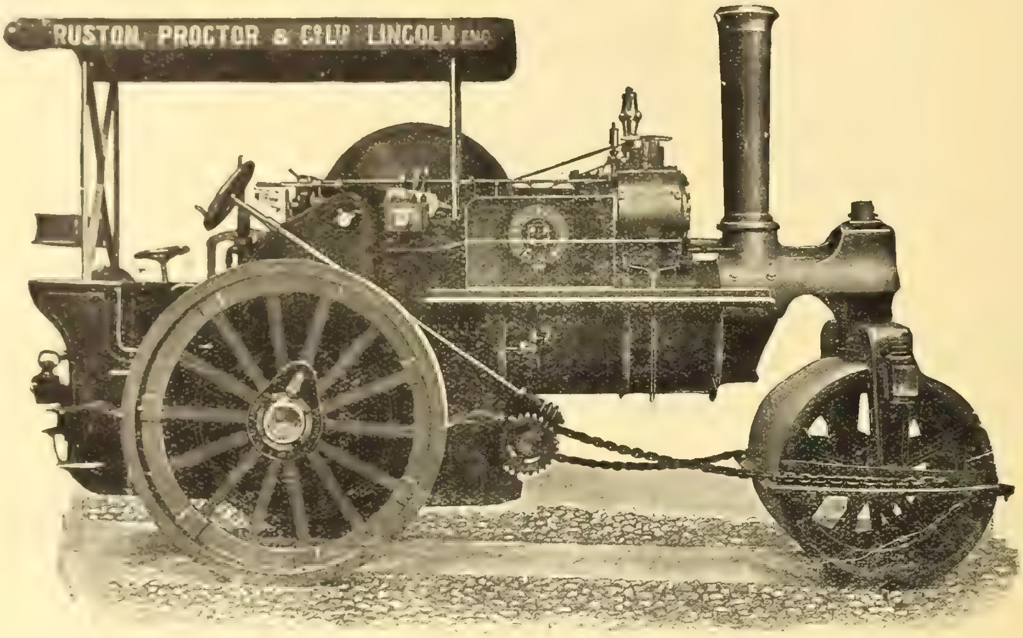
WORKS: 512 WILLIAM STREET, MONTREAL

THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO.
Limited

ROAD M



RUSTON STEAM ROLLER

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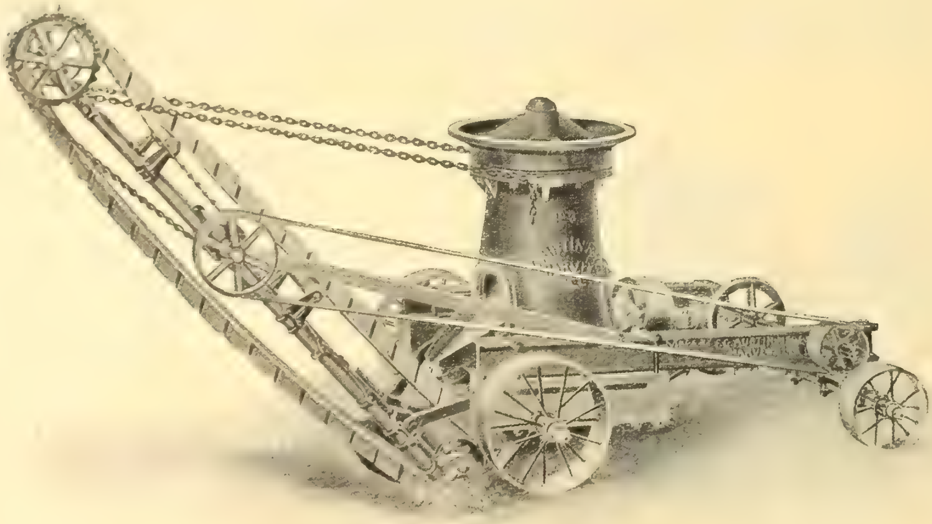

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Toronto, 73 Victoria St.
Cobalt, opp. Right of Way Mine

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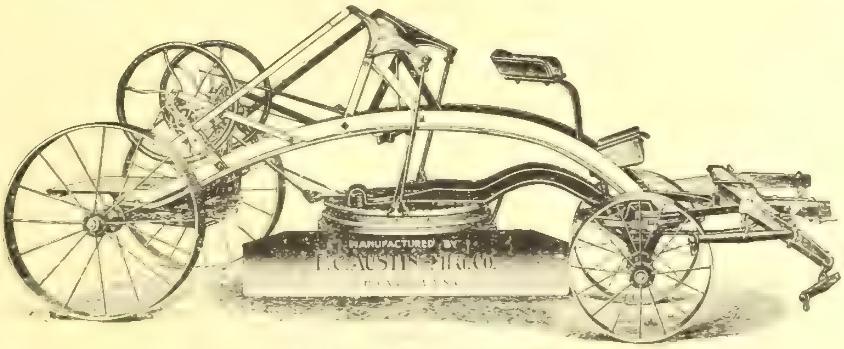
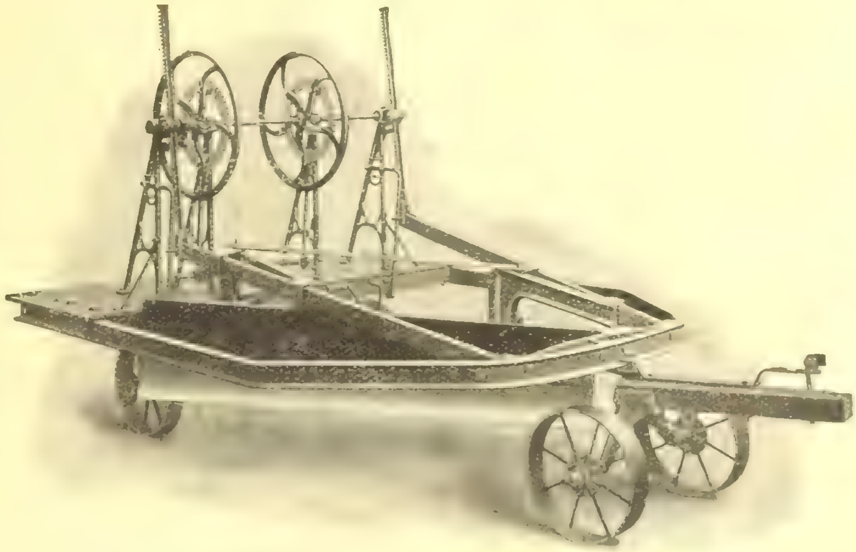


AUSTIN REVERSIBLE ROAD MACHINE



LITTLE YANKEE ROAD GRADER

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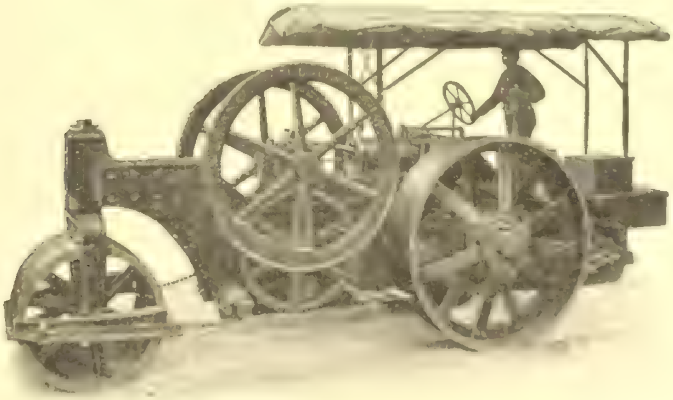

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Winnipeg, 259-261 Stanley St.
Calgary, Crown Block.
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Concrete Finishes

Concrete Floor Dressing prevents abrasion, wear, dust formation, water, oil and grease absorption.

Alkali Proof Wall Size prepares interior plastered walls for highest class decorations.

Waterproof Flat Finishes for highest class interior decoration of plaster, metal and Beaver Board Surfaces.

Waterproof White Finish, washable, sanitary, intensifies the radiation of light for interior or exterior use.

Courts, factories, elevator shafts, etc.

French Caen Stone Finish, a perfect reproduction of French Caen Stone.

GLIDDEN

Waterproofings

Transparent Waterproofing waterproofs concrete, brick, stone, granite and marble without changing color or texture.

Liquid Cement waterproofs and uniforms surface color of concrete and stucco. Bonds plaster to concrete.

Liquid Cement Filler fills cracks and breaks in concrete and stucco surfaces.

Acid Proof Coating and Graphite Acid Proof Coating for iron and steel submitted to **Extreme Corrosive Conditions.**

Liquid Rubber for dampproofing interior surfaces of exposed walls—plaster applied over it—for waterproofing basements.

Liquid Rubber Cement for filling expansion joints.

Booklet covering the above materials and Specifications for use, also samples sent gratis, upon request

The GLIDDEN VARNISH COMPANY, Toronto, Ontario

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ESTABLISHED 1886

Contract Record

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

PUBLISHED EACH WEDNESDAY BY

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Vol. 25 January 25, 1911 No. 4

The Law of Compensation Proportionate to Performance

Among the ten fundamental laws of business management, as formulated by Gillette and Dana in their work on "Cost Keeping and Management Engineering," the most important is the seventh: "All payments for work should be proportionate to work done." There are five ways in which business managers have attempted to follow this law, where they have attempted it at all, namely:

1. By the payment of higher wages or salaries to the most skilful and most intelligent individuals.
2. By payment of a wage with a sharing of profits.
3. By payment per unit of work done.
4. By giving a bonus, commission, or the like, in addition to a regular wage or salary.
5. By a combination of two or more of the foregoing methods.

The first method is a crude attempt to follow the fundamental law of economic management. The degree of its crudity depends upon the conditions of supply and demand in the labor market, the strength or weakness of labor unions, and the variable notions of employers as to the worth of individual employes. The graduated wage method of payment, if we may so designate it, is not without merit, particularly as applied in the payment of managers, superintendents and foremen. In a rough way the employer measures the producing efficiency of such men, and attempts to reward them by higher salaries for increased profits due to their wits or energy. When, however, we come to the compensation that men in the ranks receive under the wage system, we find far less intelligence displayed by employers. Here are large bodies of men, classed almost alike as to wages, regardless of individual ability. Can we wonder at the restlessness of the wage earner under such a system? Can we find fault with him for listlessness? Is he to be blamed for listening seriously to socialistic doctrines? The wage system in its present form is assuredly doomed. Those managers who abandon it first are the ones most likely to win greater profits for themselves while giving greater income to their employes.

Sharing Profits.

The second system of payment has been widely advocated in years past, but, in spite of frequent trial, has never become strikingly effective. Its drawbacks are many. To be perfectly fair, a profit sharing plan involves its converse—a loss sharing plan. If employes are to receive extra compensation in the fat years, they should suffer a deduction from their wages in the lean years, which none as yet has been found willing to do. Even a more serious objection, however, is that a profit sharing plan violates the law of prompt reward. The average workman lacks enough imagination to work hard to-day that he may receive a profit a year hence. Finally, the profit sharing plan fails miserably, when applied by itself, because it fails to appeal sufficiently to the instinct for individual supremacy. It fails for the same reason that socialism must fail, because it asks the energetic to share with the lazy, the wise with the foolish.

The third method of payment is amazingly effective wherever it can be applied. Unfortunately it is difficult of application except in the payment of managers and employers. The manufacturer, the farm owner, the contractor and the the railway owner, are paid per unit of product. The fundamental law of social economics—payment in proportion to performance—is applied in their cases and with results that can leave no doubt whatever about the superiority of creating individual incentive. Yet the very men who are themselves thus driven to work with the greatest energy—the employers—have usually failed to apply to their employes this system of payment per unit of product.

In seeking a reason for this anomaly we need not look far. A contractor, for example, receives 20c per cubic yard for excavation, involving the use of a steam shovel and car plant. His employes are engaged in many different duties—some running the shovel, some on the dirt drains, some on the dump, some laying track, some repairing cars and tools, and so on. It is practically impossible to pay each of these classes of men on the basis of the cubic yard of excavation and do so with any measure of justice. The yardage output secured by the steam shovel gang is dependent not only upon their own efforts, but upon the size and condition of the shovel, the depth of the cut, etc. Yet they might be fairly satisfactorily recompensed on a yardage basis. On the other hand, the crews on the dirt trains perform work that is not closely measurable in terms of the cubic yard at all. Still less so is the work of the track layers and of the repair men thus measureable. Difficulty of apportioning payment on the yardage basis is so great that it is rarely attempted. Even to a greater degree would it be impracticable to pay the employes of a street railway system on the basis of the passengers carried—for that is the unit in which the street railway company itself is paid.

Payment per Unit of Work.

Piece rate payment is a unit price system for the employe in which the unit usually differs from that in which the employer is paid. Avariciousness of employers has doubtless led to the disrepute under which the piece rate plan now labors. Added to this we have the socialistic influence so strongly manifest in most labor unions. Between the employers who constantly seek excuses to cut piece rates as productiveness increases and the organized employes who aim to secure pay for the poorest workman equal to that of the best, the piece rate system has been prevented from attaining the popularity that it really deserves.

Wage Plus a Bonus.

The fourth plan—wage plus a bonus—has been slowly growing in popularity, and seems destined to find a wider application than any other method of compensation, unless we except the fifth plan, which, as yet, has been tried too infrequently to admit of satisfactory comparison with the others. The bonus system was probably first applied extensively in the payment of traveling salesmen, who received a salary plus a commission on sales effected. Perhaps a claim to priority might be raised for the "tipping system" of paying waiters, which is essentially a bonus system wherein the patron pays the bonus. In passing, we may add that the persistence of the tipping system is due to the fact that it secures better service through the stimulus that the tip—the bonus—creates. So long, therefore, as no better application of the bonus system in restaurants and hotels is devised, the tipping system will retain popularity.

A few far-sighted merchants have adopted a bonus system for paying their clerks. Each clerk receives a small commission on the sales that he effects, in addition to his salary. The result is unquestionably more intelligent and more obliging service, which, in turn, draws more custom.

The greatest difficulty that usually arises in attempting to apply the bonus system is the difficulty of finding satisfactory units in which to measure the output of employes of each class, and particularly of individuals. How, for example, shall the work of train conductors be measured? In train-mile units? The train-mileage, however, is only to a degree within the control of the train crew. Yet we believe that any well conceived plan of paying train crews a bonus on train-mileage would aid remarkably in increasing the present average mileage performance, just as certainly as bonus for small coal consumption has effected marked reduction in fuel used on locomotives.

To contractors who adopt the bonus system and apply it justly, even liberally, there will come not only greater profits than they now receive, but the satisfaction of having aided in bettering the condition of their employes.

To engineers who introduce the bonus system in the management of public utilities will come positions of large emolument and the respect of the world. Such engineers will raise the status of their entire profession to a managerial science.—Engineering-Contracting.

Rules for Measuring Concrete and Excavation

A joint committee, consisting of architects, engineers and contractors of the City of Chicago, has recently adopted rules for the measurement of excavation and concrete work. The formulated rules cover all the details of this kind of work and building construction, defining specifically how certain classes of work shall be paid for. The adoption of this set of rules, according to our contemporary, the Contractor of Chicago, is the outgrowth of difficulties in coming to an agreement for compensation, entailing not only disputes and bad feeling between the parties, but litigation as well. It is only natural that a contractor will make claims for extra compensation when his margin of prifit is dwindling because he was obliged to go to additional expense in erecting forms of concrete or sheeting in for excavation, which could not be foreseen when he made his estimate. Under the rules drawn up, provision is made for these contingencies and extra compensation is allowed where excavation becomes difficult, or where forms for concrete are complex, so that they require not only more time, but additional outlay for material.

There can be no doubt that the step taken by this committee is in the right direction, and that much resultant good will be the outcome. More than this, it is worthy of imitation and an extension with modifications to suit, into the general contractors' field. Here it would undobutedly prove quite a factor in solving some of the problems which arise in reference to proper compensation. Most contractors would not require deep research in the repertory of their work to adduce instances of this kind, where, for instance, the encountering of a certain kind of material made the execution of the work a dead loss at agreed prices, which would not have been accepted had the circumstances been foreseen. It is a fact well known to contractors that in many of these cases the solution has to be sought in the arbitrary decision of the engineer, who would or would not allow additional compensation, according to his interpretation of the contract or specifications. In almost every contract instances of this nature arise, and it would seem that a logical solution would be the establishment of standards to cover these contingencies.

As a step toward standardization alone, this Chicago body has marked an advance. A little study of organization proves that the establishment of standards has been the keynote of success for all enterprises, which would apply in this case. It would furthermore promote good feeling betwen all parties concerned, which in turn would result in better work. Another benefit which would result from this is that the establishment of such rules of measurement in the general contracting field would make a better basis for estimate.

Heavy rail sections are being tested on the Central Railroad of New Jersey on certain lines carrying very heavy and fast traffic over tracks having an unusually large amount of curvature. The 90-lb. rails in regular use wear out rapidly, and the company accordingly decided to try much harder steel, which made it necessary in turn to use a large section in order to keep down the unit stresses. The new rail is 6½ in. high, weighs 135 lbs., and has from 0.9 to 1.10 per cent. carbon. It is made by the open-hearth process, with phosphorus under 0.02 per cent., and is curved at the mill, the rails being numbered after bending to indicate their position in the track. A check on the experiments with these heavy sections will be afforded by the behaviour of over 14,000 tons of 100-lb. rails containing 0.75 to 0.83 per cent. of carbon for open-hearth steel and about 0.65 per cent. for Bessemer steel.

Reinforced Concrete Roof Arches with a clear span of 50 ft. have been used in the building for the Hammersmith Baths, London. The main members are arch ribs with segmental circular intrados and without tie rods, carried with their springing lines about 17 ft. above the piers on which the columns rest. The ribs, as described in "The Builder," London, are approximately 12 ft. 9 in. on centres and carry reinforced concrete purlins for the roof decking. Surmounting the arches is a monitor of concrete construction. Cantilever galleries on both sides are carried on the columns about 7 ft. below the springings. Outside are roofed passageways, constructed monolithically with the main parts of the structure.

Deep Well Drilling in Saskatchewan

Contributed by J. M. Wilson, Assoc. M. Can. Soc. C. E.,
City Engineer of Moose Jaw, Sask.

In a country impoverished in respect to natural water supplies, and remote from the sources of supply of fuel, the natural inclination is to bore into the bowels of the earth, and unfetter if possible pent up supplies of pure water or natural gas. The city of Moose Jaw is at present drilling a test well, 3,000 feet deep, and a summary of the results shown by the first 1,160 feet of drilling may be of interest from a geological standpoint.

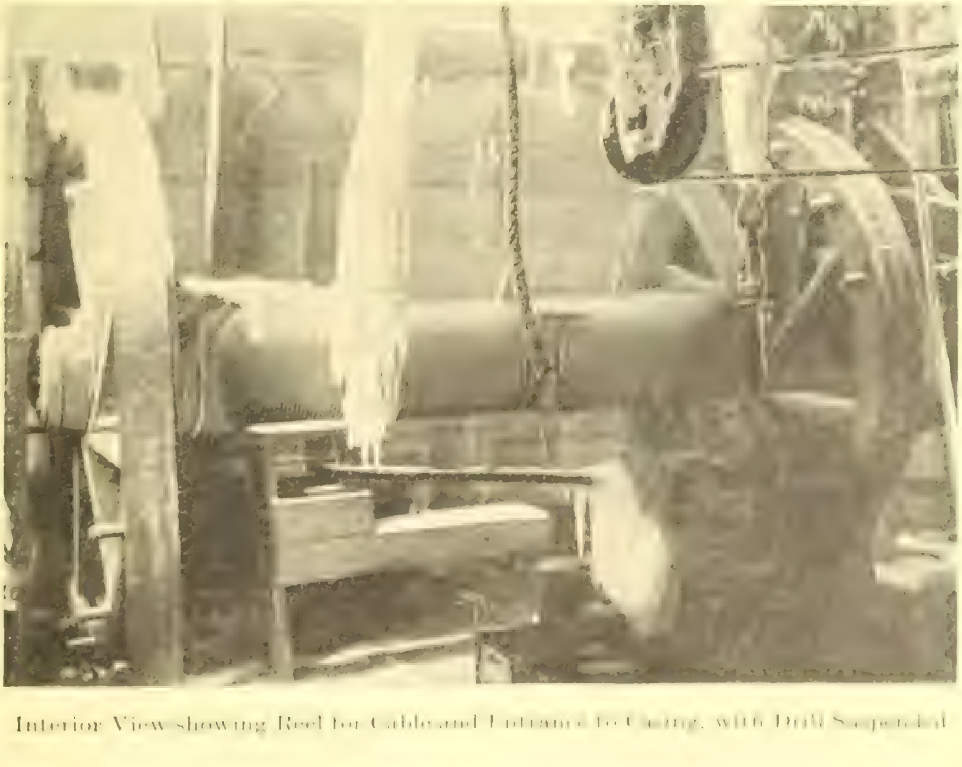
The well is located in the S.W. ¼ of Sec. 33, Township 16, Range 26, West of the 2nd Meridian, and within the incorporated limits of the City of Moose Jaw. Drilling was started in the Spring of 1910 and has been continued until the present time, a depth of 1,160 feet having been attained.

The following table shows the nature of the strata encountered at different depths:

Depth From	To	Material	Color	Hard or Soft	Remarks
1	5	Clay	Grey	Hard	
5	19	Gravel & Sand			Very fine sand.
19	455	Clay	Grey	Hard	
455	480	Sandy Clay	Grey		Struck water at 468 ft.
480	555	Clay	Grey	Hard	
555	600	Sandy Clay	Grey		
600	777	Clay	Grey	Hard	
777	790	Sandy Clay	Grey		
790	890	Clay	Grey	Hard	
900	910	Sand	Grey		Very fine sand. Struck water at 903 ft.
910	920	Sand & Rock Shale	Grey		
920	930	Shale & Clay	Grey		
930	960	Sand & Clay	Grey		
960	1010	Sand	Pepper & Salt		Struck water at 968 ft. Flow of 1200 gals. per hr. increased to 4000 gals. per hr. at 985 ft.
1010	1020	Sand & Clay	Grey		
1020	1030	Clay & Shale	Grey		
1030	1160	Clay	Grey	Hard	

The water supply encountered at 468 feet must have been only a pocket, as a pumping test lowered the water permanently. The supply at 985 feet looked very encouraging and it was decided to apply a pumping test. By lowering the water 80 feet in the casing, the level remained constant for 21 hours and the supply was in-

General View of Exterior



Interior View showing Reel for Cable and Entrance to Casing, with Drill Suspended creased to 10,000 gallons an hour, this being the capacity of the pump used.

An examination of this water resulted in the following analysis: Parts in 1,000,000—Suspended solids, 20; dissolved solids, 5,995; loss in ignition of dissolved solids, 370; chlorine, 3,000.

"B" Coli absent and sulphates in very small quantities.

The above analysis points to a spring water highly charged with mineral salts, but uncontaminated with sewage matter. From the appearance of the residue on evaporation, the greater part of the saline matter was probably calcium chloride. Owing to its large chlorine contents, this water was practically unfit for domestic purposes, and certainly unfit for manufacturing purposes and boilers.

The well was started with an 18-inch casing which extended for 150 feet, and then changed to 600 feet of 14-inch, the remainder being 10-inch pipe. The work is in charge of the Wallace-Bell Company, of Montreal, whose contract calls for a price of $10 per foot for a 3,000 foot well. The work is being pressed to completion, and it is the hope of the municipality that further development will yield an abundant supply of either fresh water or natural gas.

Importance of Party Walls

By Owen B. Maginnis

At the outset of this article the reader might rightfully ask, what is meant by a "party" wall? Webster defines a wall of this kind as "a wall that separates one house from the next," which is correct as far as it goes, but it doesn't go far enough from a constructive standpoint, according to the American Carpenter and Builder.

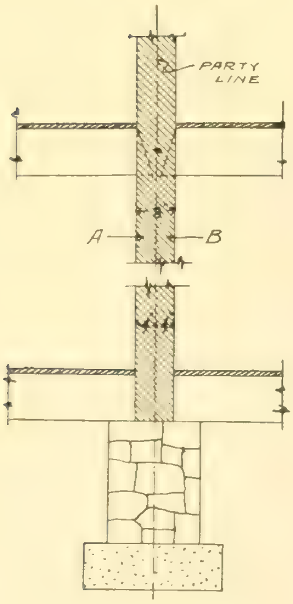


Fig. 1

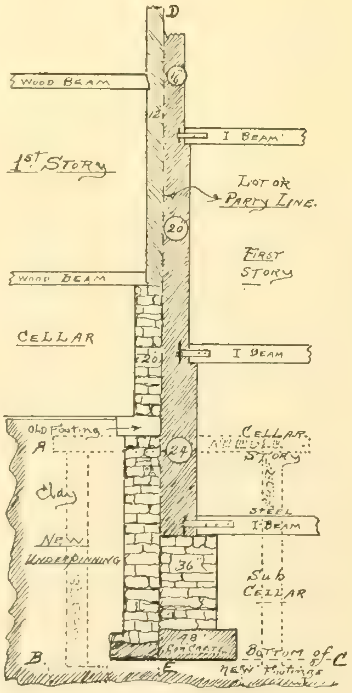


Fig. 2

It is not only owned by different parties, but is, in its utility, fulfilling two functions as a bearing wall, as will be seen in Fig. 1. In this sketch there is represented an 8-inch party wall, one side of which is owned by "A' and the other by "B." "A" owns 4 inches and "B" 4 inches, respectively, and each owner is entitled to what is technically known as "beam right," that is to say, the right to place the ends of floor beams in the wall without endangering its safety

The foundation is of stone, the upper part of 8-inch brick. This thickness of party wall, however, is now a thing of the past, having been mostly used in small one or two storey houses.

The next thickness of party wall we come to is the 12-inch wall, where, of course, the dividing vertical line entitles each party to 6 inches on either side. This thickness of awll is consistent up to a height of 3 stories or perhaps four; but beyond this it is hardly safe. Much depends, however, upon the character of the building and its uses. For example, there is a difference between a wall built of cement and one of lime mortar in bearing capacity, and between a warehouse wall and a dwelling-house wall. Forty feet is about the best limit in height for a 12-inch party wall.

There are some very curious features in connection with party walls which are not known among the general run of builders and with which they should be familiar. For instance, it is not permissable for the owner of one side of a party wall to alter, strain or endanger the same by cutting into it or weakening its structural value in any way, without the consent of the next interested party, and he is liable for damages for so doing. He cannot sell or deed his half without the signature of his neighbor being affixed to the instrument or deed.

To illustrate this let us refer to the sketch, Fig. 2, where the importance of party walls is fully exemplified and the work of which was recently carried out. Originally there existed where these two walls are represented an old 12-inch party wall separating two old business buildings. Both owners were desirous of improving the property, so by mutual agreement "B" sold his entire half to "A," thus moving the line 12 inches east, to the right in sketch as shown, thus nullifying its party value, so the improvements were proceeded with as follows: "A" needled his wall below the bottom stone and underpinned his foundation down to the level of the concrete in "B's" building in the manner seen to the left, doing this for the protection of his own building and to gain a subcellar. When this was done "B" set his concrete footings and commenced the erection of his new building to the entire satisfaction of everybody concerned.

Fire was the means employed to demolish an old 210-foot smokestack at Thirty-second and Walnut streets, Philadelphia. When the final crash came and the forty-five-year old shaft crumbled to earth in a heap the sight well repaid the many hundreds who journeyed to the shop to witness the razing. The Pennsylvania Railroad Company recently purchased the site to enlarge their West Philadelphia freight yards and desired the site cleared quickly. The contractor's foreman examined the stack and its surroundings and reported that the shaft could be "burned down," and several weeks ago began tearing down the small buildngs to the east of the stack, and after this work was completed bricks were removed from the eastern base of the big chimney and replaced by wooden shorings until almost the entire weight of the stack was borne up by the timber. Bricks on the west side of the base were left in position. This arrangement, it was calculated, would insure the chimney falling in a heap, practically where it stood. Several gallons of oil were poured on the wooden supports and a match applied. Inside of an hour the stack fell

Pioneer Road Making in Saskatchewan

Preliminary Work and Organization—Circuitous Routes to Avoid Expensive Construction —Increased Grants Now Being Made by Government — Satisfactory Outlook

By F. J. Robinson, Deputy Minister of Public Works

The Province of Saskatchewan is one of the two youngest sisters of the Canadian Confederation, having been granted provincial autonomy in 1905, when the Provinces of Saskatchewan and Alberta were organized out of the southern portion of the territory previously known as the Northwest Territories. It may be further explained, in order to emphasize the title of this article, that the territory now comprising these two young and vigorous Provinces was, when the Province of Manitoba, which adjoins Saskatchewan on the east, was organized, not considered worth including in that Province and for some years after the name Northwest Territories, to the residents of eastern Canada, was synonymous with a band of rebellious Indians, a few brave cattle and horse ranchers, a corps of mounted police, and a boundless prairie fit only to produce cactus and alkali water.

Here and there the Hudson's Bay Co. had established fur posts, and between them the only roads, or trails as they were then both in name and reality, extended. These trails usually continued in a general direction between the objective points, but direct roads were sacrificed for the sake of keeping on high, dry lands, diverting in all directions to pass by good water, or to reach fordable crossings of the rivers. These features are so evident while traveling these old trails that one is almost assured that the Hudson's Bay Company's freighters and the police followed the paths of the early Indians, who, in turn, doubtless were led to the good watering places and easiest river crossings by the first monarchs of the plains, namely, the North American buffaloes. So it would appear to the student of nature that the roads, part of which in some places are the main roads of to-day, were located by the buffalo and perpetuated by circumstances, serving in turn the Indians, the traders, the police, the ranchers, the immigrant in search of a homestead, later the same party to market his grain, and finally even the street of the towns and cities, a notable instance of which, though in another Province, is the old Red River trail, now the main street in the city of Winnipeg.

Preliminary Work and Organization.

So long as the settlers left the Northwest Territories to the ranchers, road making was a matter of small import. To improve a hill or throw a little dry earth on a wet spot was all that was considered. The ranchers were, as a rule, content to cross the rivers for supplies at a time when the ice was set or when low water permitted fording, but the settler who grew grain required more service, and bridges ceased to be a luxury. For some time fencing was not carried on to any considerable extent, and the grain growers were obliged to permit the public to continue along the shortest route to the nearest railway station. This, however, could not last long, for the increasing traffic, owing to the land becoming more thickly settled, caused havoc to the crops for rods wide along the principal roads; so by fencing, placing notices and general regard for individual rights traffic was forced to the road allowances which, in the greater part of Saskatchewan, are 66 feet wide. This produced the consequent necessity of more vigorous road making, filling and raising wet places, always called "sloughs," grading and placing culverts across ravines, generally known as "coulees," and bridging the streams varying in size from the mere spring freshet creek to the Saskatchewan River. Over this the Government has erected, at Battleford, a bridge 1,850 feet long.

The first provision for public money for roads was a grant by the Federal Government of the Dominion of Canada, which was placed under the control of the Lieutenant-Governor of the Northwest Territories, whose Advisory Council distributed it as best they could where the small amounts available would do the most good to the greatest number. Later the Advisory Council developed into a Legislature whose members were allotted equitable sums to distribute over their constituency. Still later and within a few years of the organization of the Province, the Government was divided into departments, and the Department of Public Works was organized with a staff of engineers and surveyors to supervise the expenditures on public improvements.

The writer joined the staff in 1901 and was stationed at MacLeod, now within the Province of Alberta, where, as in the eastern portion of the Territories, or the present Saskatchewan, the duty of the district engineer was to find a road to market for settlers, or a colony of them, who had gradually become hemmed in by fences or natural obstructions. The funds available for this purpose were limited, so that circuitous routes were resorted to in order that natural obstructions could be overcome by crossing streams at the least expensive points, and private lands were crossed by surveys and the subsequent purchase of the areas required for road purposes.

Road making was not the only channel of expenditure of the Northwest Government, so that only a portion of the Dominion subsidy was available for this service. The increasing settlements were continuing to limit the travel to narrower lines and it was found advisable to levy a tax of 1¼ cents per acre on all occupied lands to assist in the road making operations. This tax was at first collected entirely by the Government and expended under the supervision of the Department of Public Works, but by degrees the more thickly settled districts were allowed to form into improvement districts and by elected Councillors collect and spend taxes within their boundaries, the Government continuing to act as trustee for the funds collected in the sparsely settled portions of the Territories. A similar system prevails now in the Province of Saskatchewan in the parts that have been lately settled, but in the more advanced portions municipalities have been created and the Councils have thereby acquired powers and responsibilities almost equivalent to those enjoyed by the towns and cities.

Increased Subsidies from Government.

Since the organization of the Province the subsidies received from the Dominion Government have been greatly increased, and notwithstanding the fact that large expenditures are required annually for the various other purposes, a substantial sum has [illegible] been set aside for the construction of roads and bridges.

As the road system within the area comprising the Province gradually evolved from the trail to the highway, so have the expenditures been gradually systematized from the first patching of bad spots and the subsequent improvement of colonization roads, until now our expenditures are concentrated on main roads, leaving the lateral roads to be improved by the local organizations with moneys collected by them.

The bridges were at one time built by contract. This method was found undesirable owing to the fact that few were equipped to properly carry on the work, therefore Government bridge crews were organized, who, by training and practice, have become experts, and a great saving of money is effected, as well as a superior quality of bridges secured. All classes of bridges are constructed by these crews, the timber for the wooden structures being purchased by the Government from the mills and shipped direct to the station nearest the site of the bridge. The metal for the steel bridges is manufactured according to our standard specifications by bridge companies in eastern Canada and erected by our crews. All the bridges erected during the past three years are designed to carry a 24-ton traction engine under steam.

The road grading was at one time done by settlers living close to the work, who were instructed to engage men and teams at times convenient to themselves and their neighbors. This method for many reasons was found inefficient and savored too much of the old statute labor laws of the older Provinces, where road work days were often considered a semi-holiday. The local foremen were superseded by organized grading gangs, consisting of an experienced foreman, from eight to twenty teams and drivers and the required number of scraper holders and shovelers, all of whom are engaged for the season, equipped with plows, scrapers, both wheel and slush, a road grader and cook outfit. These gangs, like the bridge crews, become experts and set an example to the local Councillors in road making, not only in the class of work, but in the system of carrying it out.

For the past three years we have been encouraging the use of road drags by parties living on graded roads. In order to establish one in each district we offered to pay $1.25 per mile of road attended, six times over to be the minimum, the drag being sent to some reliable farmer, with instructions how and when to use. The result has been very gratifying, not only from the standpoint of the particular road attended, but also from the fact that the Councillors have realized the advantages of the road drags and are using them on their own account.

During the last ten years the Government has expended by the above methods $4,427,444.83, of which $508,522.37 has been collected from the settlers as a road tax. The local organizations have collected during the same period $2,992,640, making a total of $7,420,085.27 expended on roads in Saskatchewan, distributed through the years as follows:

	Government funds.	Road tax collected and spent by Government.	Taxes collected and spent by Local Councils.
1900	$85,445 67	$5,598 42	Ret. incomplete
1901	82,046 11	33,793 95	$56,377 90
1902	130,102 41	36,920 92	77,136 18
1903	142,216 56	36.781 24	86,070 98
1904	217,041 40	92,412 38	94,841 22
1905	202,783 48	70,798 72	218,967 19
1906	297,610 65	56,150 62	325,798 97
1907	902,868 98	61,934 83	574,000 00
1908	1,308,879 09	43.139 59	653,000 00
1909	549.928 11	70,991 70	906,448 00
	$3,918.922 46	$508,522 37	$2,992,640 44

This year a slight departure was made, in that, in addition to about $700,000 spent by road crews, a sum of $60,000 was set aside to assist rural municipalities in the construction of main roads. Regulations governing the distribution of this amount were put in force, which were intended not only to protect the public funds, but also to enforce systematic methods of carrying on the business of these rural organizations and to stimulate a main road policy by the improvement of roads which will in the future become trunk highways throughout the length and breadth of the Province. On the whole, the result has been very satisfactory, some $50,000 of the Government grant has been earned, which means $100,000 has not only been expended by the municipalities, but for which value has been received on the roads leading directly into the market centers. This, added to the amount expended by the Government crews, makes a fair showing for road expenditure under Government control for a Province just past five years old. This seems an enormous amount, but let me say it is not big enough.

Last year the Province grew over 200,000,000 bushels of grain, divided between the different cereals as follows: Wheat, 90,215,000; oats, 105,465,000; barley, 8,833,000; flax, 4,488,000. It takes on an average 11c per bushel to haul it by rail to the head of the Great Lakes, amounting to $22,000,000. It is estimated, and I think the estimate is low if in error at all, that it costs one and a half times as much to haul from the thresher to the internal elevator by team as it does to haul from the internal elevator to the terminal elevator by trains, therefore it cost the farmers of Saskatchewan $33,000,000 to market their crop last year over the rural highway.

Better roads would permit not only larger loads, but more speed. We have not as yet reached the road metal stage in our road making and must be content to grade and drain, with special attention to drains. In a few places we have been obliged to haul clay to make roads through sand beds, and vice versa, but as a rule road metal has not been considered within our reach with so much grading and draining yet to be done. Still we look for road metal at an early date, that we may thereby decrease the cost of marketing the produce of the Province by at least one-third.

The Canadian Pacific Railway is considering the construction of a new connecting line between Nepigon and Savanne, which will give a direct run across from the head of the lakes, 69 miles north-east of Fort William, to a point 72 miles to the north-west. It is estimated that this straightening of the track will save from 40 to 50 miles in the conveyance of coast to coast traffic, the present distance between these two points being 141 miles.

The Annual Statistical, Review and Outlook Number of the Monetary Times is one of the most complete and interesting editions of the kind ever issued by this enterprising publication. Among the many noteworthy features of this number calculated to be of interest to readers of the "Contract Record" are the following: Canadian Money Market, by H. M. P. Eckardt; Canada's Pulp and Paper Industry, by E. B. Biggar; Western Wheat Crop Estimates, Business of the Railroads, Canadian Railway Statistics, Government by Commission, Statistics of Growth.

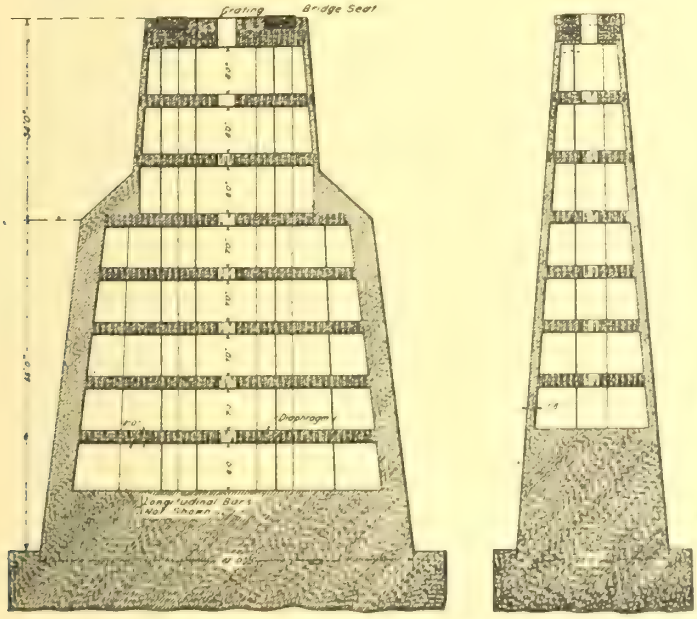
The Ottawa branch of the Civil Engineers' Association has decided to open its lectures to the press. Meetings will be closed only when the lecturer makes a special request to that effect..

A Tall Reinforced Concrete Bridge Pier

General Features of Design and Construction—A Number of Difficult Conditions Involved—Construction and Sinking of Caisson

A reinforced concrete bridge pier, 165 feet high, has been built recently in the Willamette River on a branch line of the Southern Pacific Company near Portland, Ore. At the crossing where this pier is located the Willamette River is 570 feet wide and has a depth of 65 feet in the channel at low water, the depth at the pier being 55 feet. The average high water is 25 feet above the low stage, and occasional floods go 8 to 10 feet higher. The bottom of the river at the site consists of coarse gravel to a great depth. The bridge in which the tall pier is included embraces two 300-ft. riveted Pratt-truss single-track spans with inclined top chords. The tall pier carries the shutting ends of the two spans and the shore ends of the spans are on plain concrete piers, one of which is 73 feet and the other 75 feet high.

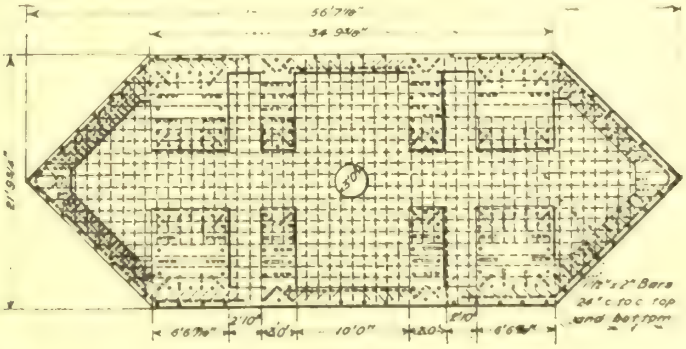
The general features of the design of the 165-ft. pier are shown in an acompanying drawing. The broad base of the pier is seated on the gravel at a depth of 55 feet below the lowest point of the river bed. The sides of the pier are battered for a height of 12 feet and above that they are plumb for 64 feet, and to that height the pier is of solid concrete. The lower 72 feet of solid masonry forms a substructure for the hollow reinforced concrete superstructure 93 feet in height. The superstructure is offset at its base from the top of the substructure and has pointed ends the same as the latter. The bottom 10 feet of the superstructure also is of solid concrete, while above this massive base it consists of reinforced concrete walls connected by horizontal diaphragms and with reinforced concrete columns carrying directly the ends of the stel spans. To a height of 55 feet, which reaches above the maximum high water of record, the sides of the hollow portion of the pier are battered 1-inch to the foot. At this height the pier is offset sharply all around to a smaller section, which is continued up to the bridge seats, with its sides also battered 1 inch to the foot.



Longitudinal and Transverse Sections of Superstructure

The outside walls of the superstructure are 18 in. thick and are anchored to the substructure by vertical 1⅛-in. Kahn cup bars 26 feet in length. These bars extend 16 feet downward into the top of the substructure, while those at the columns are continued up into the latter. The side walls of the superstructure are reinforced as vertical slabs spanning horizontally between the columns and vertically between the horizontal diaphragms, which separate the interior of the superstructure into eight stories. The reinforcement consists of Kahn shear and cup bars placed so a load can be brought on the walls from either side. The end walls are similarly reinforced with additional horizontal rods tying them back into the columns. The pier contains eight reinforced concrete columns extending from the base of the superstructure to the bridge seats. Four of these columns are built in connection with each side wall of the pier, and together with the walls, carry at the top a 5-ft. reinforced concrete slab in which two granite blocks are set as bridge seats.

Between the outside walls of the hollow superstructure are seven reinforced concrete horizontal diaphragms each 2 feet thick, which are designed as flat plates that may be loaded from above or below. The reinforcement in these diaphragms consists of Kahn shear bars placed alternately near the upper and lower sides. The lower five diaphragms are spaced 9 feet and the upper three 10 feet apart, so the span of the side-wall slabs between them is short. At the center of each diaphragm is a 3-ft. circular hole which permits the free passage of water between the eight stories in the superstructure. In one side of the lowest story is an opening 12 in. wide and the full height of that story so water may rise and fall inside the pier with variations in the stage of the river. The reinforced concrete walls of the superstructure, therefore, are not normally subject to a head of water, but the design provides for any emergency that may occur by including in them reinforcement placed so a head may be brought against the walls and diaphragms from any direction.



Plan of Diaphragm.

The pier was built in an open-timber caisson, 90 feet high, which was designed to meet the difficult conditions involved. The caisson was 40 ft. 10 in. square in plan at the bottom, the same as the base of the pier, and from its lowest edge its sides were battered the same as the sides of the base of the pier to a height of 12 feet. Above that height the sides and ends were built plumb to the top. The walls of the caisson consisted of 3 x 10-in. plank placed flat and drift-bolted together. The side walls were braced across the caisson vertically at intervals of 5½ feet, by solid 10-in. by 2-ft. 9-in. timber sections built up of 3 x 10-in. plank. Triangular pockets were formed in the corners of the caissons by solid 10-in. walls, and the sides of these pockets also were braced at the same intervals as the caisson by solid sections of 3 x 10-in. plank. A rectangular pocket, 4 ft. 10 in. by 8 in. in plan, was built on both sides of the caisson to provide sufficient space, with the triagular pockets in the later, for the ballast required to sink and hold the caisson in place.

The outside pockets were tied to the caisson by continuing the cross braces of the latter through its solid walls and by connecting the projecting ends of these braces with built-up timbers parallel with the sides of the caisson. Vertical studs were placed inside of the projecting ends of the cross braces and 3 x 12-in. plank nailed on them as lagging for the pockets. The 11 stories of braces in the caisson and in the pockets were tied together by vertical rods, and knee-braces were placed between each story in the pockets. This construction produced a structure that was amply strong under the high head and the swift current to which it was subjected while work on the pier was in progress.

The bottom at the site of the pier was first dredged to a depth of 35 feet by means of an orange-peel bucket swung from a stiff-leg derrick on a barge. Meanwhile, the lower part of the caisson and the ballast pockets were built up on ways on the shore near the work, then launched into the water and towed to place, where the balance of the framing was done in the water. The ballast pockets were filled as the work progressed so as to keep the top of the caisson about 5 feet above the water. Special care was taken to anchor the caisson exactly in position when the lower edge of it approached the bed of the river. As soon as the caisson was seated on the gravel, ballast was added to hold it in place and to sink it as material was excavated from the inside of it. The orangepeel bucket was used through the water to remove the material from the inside so the lower edge of the caisson finally went about 20 feet into the gravel and made the form for the base of the pier.

While the sinking of the caisson was in progress, a concrete mixer plant was set up on a barge. As soon as the caisson was down to the required depth concrete was deposited through the water by means of bottom-dump buckets to fill the caisson uniformly to a height of 72 feet. The water was then removed and the reinforced concrete portion of the pier built in the dry. The walls of the caisson also made the forms for the pier up to the offset in the latter and above that specially framed forms were built inside.

The caisson was constructed and sunk to place in twenty working days; the concrete seal then was poured, the water removed and the pier built with all possible speed, because the time of high water was approaching. By working day and night, practically without interruption, the pier was kept above the stage of water in the river and was completed before the water reached the top of the caisson. Concrete was placed at an average rate of about 200 cubic yards a day, the 7,000 cubic yards in the pier being deposited in 35 days. The forms for the hollow portion of the pier were built and erected as the work progressed, since they involved practically the same conditions as an 8-story building of like size.

Within 25 days after completion of the pier the river began to rise rapidly, and continued until a height of 22 feet above low water was reached. The unusual stage of the freshet resulted in a great number of large logs being brought down, and during the height of it the upper part of the caisson and forms were ripped off by the force of the logs which struck it. The pier stod safely, however, and when the water receded no evidence of damage could be discovered.

City Planning As Seen By Landscape Architects

Strictly speaking, city planning is not a new science; but it is comparatively new in this country. In general, we have to go to the Old World to find cities which have been upheld by the landscape architect. The landscape architect's city is planned after a composite of all that is best in the Old World cities, revised and brought down to date to meet modern requirements.

The fundamental principle of scientific city planning as practiced by the landscape architect of to-day, is first, convenience; second, beauty. Your modern city must be convenient to be successful. The theoretical city would be planned in a circular form, with all points in the outskirts esually distant from a common center, and with radial boulevards in every direction, like spokes of a wheel, connected by encircling drives about the circumference.

Paris, on account of its peculiar situation, being surrounded by three walls of fortification, was forced to adopt a radial and encircling street system to facilitate the handling of troops from the center of the city to the fortifications. Afterwards this was found to be so practical for the ordinary city traffic that other cities, notably Berlin and Moscow in the Old World, followed its example. Thus we established a principle which is being applied, as far as local topography will permit, in the readjusting of our street systems to meet modern traffic conditions.

Let me describe briefly the ideal city of the landscape architect. It is planned in conjunction with engineers, architects, sculptors and landscape gardeners. It is a metropolitan and preferably a harbor city. Its approaches by rail and water are attractive, artistic and imposing. Its traffic is centralized, the railroads entering a union station below grade and the electric systems entering at the same point, also by means of subways. Its business streets are wide, clean and well lighted and paved; the sidewalks are wide; the residential section is well parked; a uniform system of street trees, under the care of a city forester, is to be found. The parks, playgrounds, plazas and parkways are well designed, connected by wide parkways or boulevards shaded by trees and accessible by foot and electric cars.

The entire metropolitan park system should be under the control of an active, wide-awake park commision appointed for a term of years, acting in conjunction with a consulting landscape architect. The commission should be free from political influence and backed with sufficient funds to make their work effective. No really modern harbor city is without a beach reservation for its municipal bathhouse.

Not once in a lifetime does the landscape architect have an opportunity to plan an entirely new city along modern lines, embodying all that is convenient and beautiful. But our newer cities now a-building have no excuse for making the same old mistake over and over again. There is no excuse for misplacing our municipal buildings. To make an ideal city out of our present American cities would require some changes in our laws, especially those covering excess condemnation proceedings. The best city improvement plan conceived by our civic experts can be completely blocked by a few selfish individuals—witness Baltimore and San Francisco.

The landscape architect's ideal city is not a city improvement plan developed in a month's study, for no city can be comprehensively replanned in less than sixteen months or two years. To be of value, a plan must first of all be practical; every business interest must be considered; its future growth and present needs must be studied. A comprehensive plan is of the utmost value to a city if only to point out land which must be acquired for its subsequent development. The improvements on this land may be deferred until needed. It goes without saying that no landscape architect plans for city slums, but he seeks to have open spaces for light and air in the poorer quarters where people must necessarily live more closely together.

Cost of Reinforced Concrete Construction

Factors Which Influence Contractors In Bidding Upon Work Gradual Elimination of Uncertainties—Two Principal Methods Now In General Use

Reinforced concrete construction has developed so rapidly and has been used such a short time that only recently has anything like a standardization of cost been attainable.

In taking bids upon reinforced concrete construction, architects and engineers are finding that the estimates are running closer than formerly—that is, there is not the great variation between the highest and lowest bid that existed five years ago, says M. M. Sloan in The Building Age. When reinforced concrete construction became a prominent factor in building work many reinforced concrete contractors started this business as a specialty. Some of these contractors had been contractors for plain cement work, and others were engineers who, owing to their technical knowledge, thought of applying it with the contracting business in this special line. Neither of these types of contractors was any too familiar with nor had much experience in the carpentry work required for the forms, and, in fact, without precedent it would have been difficult for a master builder of any kind to have definitely estimated upon the cost of the forms required in reinforced concrete construction.

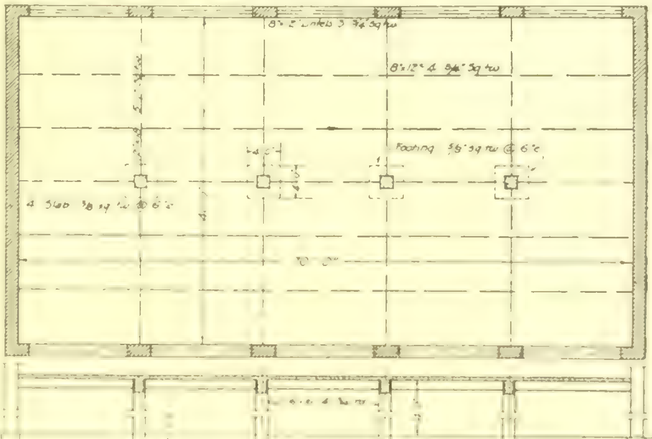
Those who have had to do with the estimated cost, either in shop work or the cost of building labor, know the difficulty in placing an estimate upon any particular piece of work and have the final results of the cost ledger for labor agree with the estimated cost. In any instance a labor estimate is not much better than a good guess, and it is impossible to make an accurate estimate of labor cost in every instance with any degree of certainty.

As the cost of the form construction necessary for the construction of reinforced concrete work is a considerable item in the total cost, it was not long before the contractors in reinforced concrete work found that in many instances they had taken the work at too low a price, and the failure of several prominent concrete contractors is directly traceable to their inability to accurately estimate upon the cost of the form construction for large operations.

On the other hand those who survived the first few years in operating with the new construction gradually accumulated data which, when averaged, gives a pretty accurate basis upon which reinforced concrete work may be estimated.

In estimating upon reinforced concrete work two methods generally are employed. The first consists in taking off accurately the quantities of all material and separately estimating the labor required for each branch of the work, while the second method is to figure only the quantity of concrete and tonnage of the steel, and, in some instances, the amount of lumber required in the form construction in board feet, and apply to these quantities unit prices which cover the cost of labor and material.

The first method is undobutedly the surer and most intelligible of the two, though very close approximations to the exact cost may be obtained by the latter method.



Plan and Section of Reinforced Concrete Slab for Floor System.

The designer of reinforced concrete construction is constantly impressed with the different way in which the several contractors analyze the design with reference to the determination of the cost. Certain contractors will carefully consider the labor of removing and reconstructing the forms and will consequently give a much lower figure on the work, if the same sized columns and beams and girders are used throughout, even though by so doing the quantity of concrete is somewhat increased.

Again, if the contractor is in the habit of figuring the concrete at so much a cubic yard, the designer would not find economy in thickening a floor slab in order to use the same beam and girder spacing and thus utilize the forms used in another floor of the building, whereas the designer would be justified in thickening the floor slab an extra inch or two if he would take into consideration that this extra thickness could be put in a place at a very low unit price from the fact that the plant and equipment justify the change in the thickness of the slab construction.

While the cost of reinforced construction varies with the local prices of labor and materials these are becoming so generally uniform that the cost of reinforced concrete construction is approaching a standard cost for construction of the same type.

The review of an estimate for the usual slab beam and girder construction of a floor system is interesting and may be instructive. The construction shown in Fig. 1 is to be estimated upon and the framing plan and section are shown in the figure with dimensions and not giving the reinforcement complete.

In making estimates a systematic tabulation of the quantities of concrete, reinforcing steel and material for centering greatly helps in avoiding mistakes and is much clearer if future reference has to be made to the estimate.

Referring to Fig. 1 the quantity and labor estimated are as follows:

Concrete.	Cu. Ft.
Concrete in slab, 75 × 40 ÷ 3	1,000
Concrete in beams and lintels, 14 × 2-3× 35	327
Concreter in girders, 19 1-3 × 1½ × 8	232
Concrete in column, 15 × 1 7/9 × 4	107
Footing, 4 × 4 × 4	64
Total amount of concrete	1,730—64 cu. yds.

Steel.	Pounds.
Slab reinforcement, 75 × 2 × 40—7000 ft., at .498	3,486
Add for lapping of bars, waste, etc., 10 per cent	348
Beam reinforcement, 1500 ft., at 1.92	2,880
Add for laps, etc., 75 ft., at 1.92	144
Girder reinforcement, 800 ft., at 3.4	2,720
Lintel reinforcement, 450 ft., at 1.92	864
Secondary reinforcement, 7½% of beams and girders	496
Column rods and ties	584
Reinforcing rods for footings	260
Total amount of steel reinforcement	11,782

Lumber for Form Construction. (Considerng only one floor to be constructed)	Ft. B.M.
4/4 matched flooring for slab centering, 75 × 40	3,000
Add 25% for tongue and groove	750
Add 5% for waste in cutting and handling	150
1½ dressed plank for side and bottom forms of beams and girders:	
Beams	1,500
Girders	1,200
Lintels	450
Studding, 10,500 ft. 3 × 4	875
Ledger boards, 1× 6, 1,500 ft.	750
Miscellaneous lumber	500
Total amount of lumber required	9,175

It will be observed that in the above estimate the items have not as yet been priced, and it is in the pricing of the items that the method of estimating principally differs.

For a rapid estimate, one which is pretty sure to be approximately correct, and yet one that could not be so well used in close competition, can readily be made from the above estimate of the amount of materials required by totalling the itemization for each material and taking a unit price, which is the actual cost price for the work completed.

In the eastern part of the country, at least, concrete can be placed in floor construction, with the usual thickness of slabs and the usual size of beams and girders, at a net cost of $6 per cubic yard. As a general rule, steel can be bought delivered, bent and placed at an average cost of about $50 a ton, or 2½ cents per pound. In large operations, where the beams and girders are heavily reinforced, this cost may reduce to $48 a ton, and where the construction is light and the amount of handling and placing is improportionately large, owing to the peculiarties of the construction, the cost may run as high as $55 or even $60 per ton. However, 2½ cents a pound is a good average price for the steel complete in the forms.

In figuring the lumber and form construction the several grades used vary considerably in price, but on an average estimate can be taken at $25 for the material, plus an equal cost for the labor, or a total cost of $50 per thousand feet board measure. This unit price may be applied to the totals in the estimate, and the cost estimate for the construction shown in Fig. 1 will then be as follows:

COST ESTIMATED FOR REINFORCED CONCRETE FLOOR CONSTRUCTION SHOWN IN FIG. 1.

Concrete (material and labor), 64 cu. yds., at $6.00.	$384.00
Re-enforcing steel (material and labor), 11,782 lbs., at 2½c.	294.55
Lumber and carpentry work, 9175 ft. B.M., at $50.00 per M.	458.75
Total actual cost of construction	1,137.30
Profit, charges, etc., 10%	113.73
Total of estimate	$1,251.03

As a precautionary measure all estimates should be checked in some general way, so that the possibilty of a serious omission may be avoided, and it is the practice of some contractors to check their estimates with a unit price per cubic yard for the concrete, which includes the cost of the concrete, reinforcing steel and form construction complete. The actual cost of a reinforced concrete floor system runs from $20 to $22 a cubic yard of concrete in place. Applying this approximate estimate to the above itemized estimate, in which there was 64 cubic yards of concrete required, it can readily be seen that the price of $1,251 is about correct, for 64 yards at $20 is $1,280.

In making approximate estimates upon the cubic yard basis, of course, much depends upon the character of design—whether the floor system is in uniform-sized panels or whether it is considerably cut up, with panels of odd shapes and sizes and with numerous stairways, wall openings and other features incidental to a complex building operation. In general, however, the following table is of value in making approximate estimates on reinforced concrete floor construction, and it will be observed that in this estimate the three main items, the concrete, the steel and the form construction, are priced on the basis of a cubic yard of concrete in place, and this table gives approximate net cost without profit added:

Concrete, $6 per cubic yard.

Form work, two, three and four-story buildings, $7 to $8 per cubic yard of concrete.

Form work, eight to ten-story buildings, $6 per cubic yard of concrete.

Steel reinforcement, $4 to $7 per cubic yard of concrete placed.

The average of these items, it can be seen, will add up to from $18 to $22 per cubic yard, which agrees closely with the figure given above as the cost of reinforced concrete floor construction per cubic yard of concrete in place.

As previously stated, a very accurate method of estimating the cost of reinforced concrete floor construction is to separately itemize and price the material, and to do the same with the labor. The importance of this can readily be understood from the fact that the cost of materials varies considerably in different localities, and there are not only local advantages in prices, but, as well, the individual contractor is frequently able to obtain special prices. Besides, the cost of labor, as well, varies with locality.

Method and Cost of Finishing Concrete

By Rubbing, Floating and Brushing—Supervision of Mixing and Depositing—Machine Preferable to Hard Mixing—Economical Work Exemplified

By S. M Klein

In order to give any concrete structure a pleasing, durable and inexpensive surface finish, the most important consideration is to have a good foreman on the work; a foreman who understands how to lay out his work to advantage, who knows how to build forms, who can handle concrete intelligently, and who can train his men. Intelligent inspection and supervision is another important requirement.

Beginning with the form work, I have seen good carpenters construct careless and poor forms, when a little attention by the foreman or inspector could have remedied many defects. It is just as cheap and often cheaper to build the forms well and substantial from the start as to patch, chink and shim later on.

In constructing forms tongue and grooved lumber is not necessary. Hard pine boards, planed on one side or both, 1½ x 8 inches, will best do for face lumber. Boards of this width do not warp so much as wider boards, and do not corduroy the face to the same extent as narrower boards will. Studs can be made 2 x 4-in., 2 x 6-in. 4 x 6-in., and walls 6 x 6-in., 6 x 8-in., sometimes of 8 x 10-in., according to the nature of the work and amount of concrete deposited each day.

It is essential to start all face boards horizontally and keep them horizontal by drawing the board down with a wedge, which also closes all openings and leaves the forms tight, and nail each board securely to every stud. By shimming some boards and nailing others tight, the unsightly fins on the face can be largely avoided.

The same care need not be taken with back forms, and bulkheads; 1-in. boards can be used if securely studded and waled. However, the back forms and bulkheads should be tight to avoid honeycombing.

After the forms are built they should never stand long in the sun and be exposed to the weather. If such is the case they will need relining, shimming and chinking. The boards will shrink and warp and the whole formwork will be twisted out of shape unless kept wet. All forms should be studded carefully to avoid bending of boards betwen studs. They should be nailed every 5 feet and if possible rodded and not wired. From cost data which I kept I learned that rodding was much cheaper than wirng. Further, it was safer on large structures and, what is very essential, rodding left more working room for dumping buckets and the men to work in the forms. Rules for designing concrete forms are difficult to deduce as every structure has its own peculiarities; the amount of concrete deposited by hand mixing or machine mixing from a board or from dump buckets, all influence the design. I have built forms which were perfectly safe with a dry mixture shoveled off a board, but which began to give and needed rebracing when the concrete was wet and was dumped from buckets.

Care in Mixing Essential.

Great care should be exercised with the mixing and depositing of concrete. Ignorant supervision and inspection are often the cause of careless work. With careful and intelligent supervision and inspection all men co-operate with the foreman and inspector and good work is the result. Concrete should be thoroughly mixed and should never look raw when deposited in the forms. Where possible machine mixing is preferable to hand mixing. If hand mixing is used concrete should not be shoveled into the forms until the mixture has a uniform fatty appearance and when struck with the back of a shovel on the mixing board the concrete should be left smooth and the shovel clean. Concrete should never be mixed too wet and the cement drowned out.

On the triple 60-ft. arches built by the Pennsylvania R. R. west of Richmond, Ind., a four pan Haines mixer was used which mixed 1 cubic yard of concrete per batch. When work was started in the morning the foreman used 25 gallons of water per batch until a 6-in. layer of concrete was deposited on the bottom of the forms, then the water was reduced, but to never less than 15 gallons per cubic yard, so that the concrete quaked in the forms but water seldom accumulated on the surface. The foreman used great care in depositing all concrete in 6 or 8-in. layers, following the horizontal marks between two boards and forking the concrete with a potato fork after spading first with a shovel. The forking was carefully done by pushing the fork down into the concrete 8 inches, drawing the fork back from the face slowly to allow the grout to reach the face, then withdraw the fork and repeat the process. The man forking had to tramp around the face tamping the concrete with his feet. Spading was thus done all around, giving a homogeneous, impervious concrete everywhere.

Levelling off when the Day's Work Stops.

Generally 150 cubic yards of concrete constituted a day's work. Expansion joints were arranged in such a way as to facilitate concreting and to finish one or two sections each day. However, if a section was too large or through a breakdown could not be filled and a horizontal joint was required the foreman left the concrete at the end of the day or whenever a stop was made, perfectly level following the joint between the boards. If any excess of water was in the forms the foreman drew it off by boring holes with an auger in the back and plugged the holes the next day. A man washed the face boards with a whitewash brush and water to have them clean next day, then he forked all around the forms and with a shovel or float smoothed the concrete for 6 ins. along the face. The concrete was sound and solid around the face next day and not soggy, dirty and full of mud. At the back the concrete was left about 2 inches lower than in front and 2 x 12-in. or 3 x 8-in. plank was laid along the back and forced into the concrete. Through the center 6x6-in. timbers were forced in to form keys for the upper layer and were taken out next day.

By drawing the water off the top before closing a day's work and taking care that no water should accumulate the foreman avoided laitance altogether and never had any trouble after he learned how to avoid the same. Laitance is caused by the very fine impurities, finer than pass a 200 mesh, floating on top of the water and accumulating as the impurities increase. If the water is allowed to stand and to evaporate the impurities seldom if ever set up hard and if not cleaned off will leave a yellow band along the face, a mark showing ignorance and carelessness by the foreman and by the engineer or his inspector.

Every time a day's work is finished and a horizontal joint is thereby required, forethought should be used to either stop 6 inches below a wale, wiring or rodding, or 6 inches above. If stopped 6 inches below the wires and rods can be tightened and the face boards made to hug the previous day's work, thus avoiding an unsightly lip and a saggy contact which will always show and deform an otherwise good surface. If stopped 6 inches above the rods or wires the weight of the concrete will tighten the wire and draw the wale close to the studs and thus bring the boards tight to face. Should the foreman neglect the above precaution he must shim the boards away from the studs with shims and not just drive them out with the hammer. Unless the boards are shimmed the wet concrete will force them back against the studs and the result will always be an ugly fin.

Finishing the Forms

In finishing the forms the foreman was careful to have them the exact height on the top. He made it a rule to chamfer all sharp corners and copings with a ¾-in. beveled strip of wood. He also inserted a ¾-in. strip vertically at every expansion joint, leaving a notch 1½ ins. wide and ¾-in. deep at every expansion joint, thus doing away with irregular and saggy contact, especially where the forms were built in sections and moved, the whole face and back to construct another section and save carpenter work. In such a case the forms were oiled and cleaned before they could be used over again, and the face was repaired where needed.

The concrete was always filled an inch higher than the finished forms and was allowed to settle. Copings and exposed surfaces were well spaded on the top to bring mortar to the surface and after allowing an hour for settlement were levelled off with a straight edge, then smoothed off with a wooden trowel and stroked with a moist whitewash brush. This gave a homogeneous surface which did not scale. Topping off copings with mortar was not allowed, and better results can be obtained by spading the concrete and then straight edging than by topping off with a layer of mortar which sooner or later will crack off. As soon as the concrete was set the top of all copings was covered with an inch layer of sand and kept wet for ten days to prevent crazing.

Forty-eight hours after the last batch was placed in the forms they were removed whenever possible. If the surface was green and soft, fins were scraped off with the edge of a trowel where noticeable, then the surface was wetted with a whitewash brush with clean water and easily rubbed with a 2½ x 2½ x 6-in., 2 to 1 mortar brick not more than 8 days old. The men rubbed the wall with a circular motion which left spots in places. Next day the wall was moistened and floated all over the surface with a wooden float and after that stroked in one direction up and down with a moist, clean whitewash brush. Two men rubbed and finished a section 10 feet high, 30 feet long and three days old in four hours at 17½ cents per man per hour.

Where the concrete was a week old and older after forms were removed all fins were removed with a bush hand chisel having five blades. The surface was then wetted with plenty of cold water and rubbed with a 2½ x 2½ x 6-in. 1 to 1 mortar brick not more than six days old. One section was rubbed down well, all rod holes were plugged and next day the section was floated down and stroked with a moist, clean whitewash brush. No cement wash of any kind was allowed. Any broken corners had to be carefully repaired by thoroughly cleaning the surface, wetting the patch down well, then if possible driving 20d nails or railroad spikes into the concrete, putting up a form and grouping the broken place. Several patches were thus made and after finished could never be discovered.

The surface thus rubbed, floated and brushed bleached out uniformly everywhere, showed neither spots nor blemishes and gave the whole face a beautiful smooth dull finish. One foreman at 40 cents per hour and 6 laborers at 17½ cents per hour averaged 25 square yards per man nearly every day rubbing and finishing was done, and they became very efficient at it and took a great deal of pride in their work.

Scotchmen for G. T. P. Construction.

It is stated that the contractors for the mountain sections of the Grand Trunk Pacific propose to bring out five thousand Scotchmen to build the railway. This is the result of the hostility of the people of British Columbia to the use of Asiatic labor. No doubt Scotchmen will have to be paid better wages than Chinamen, and it will cost more to transport them by land and sea to the mountains of British Columbia than it would to carry Asiatics there, but all the competing contractors know the conditions of the labor market and no doubt they were taken into account in making tenders. The Grand Trunk Pacific Company will probably have to pay the contractors considerably more than they would if Asiatic labor could be employed, but on the other hand when the railway construction work is completed the Scotchmen will as settlers make more traffic for the railway than twice as many Asiatics would. Moreover, they will atract other Scotchmen to the localities where they settle, and any district settled by Scotchmen is likely to be prosperous and progressive.

The fact that $3,000,000 is being included in supplementary Government estimates for deepening the Back River at Montreal, Riviere des Prairies, and the French River is taken to indicate that the Government has at length decided to go ahead with the Georgian Bay Canal. The works mentioned would all be of utility in any event, but they are also on the proposed route of the canal, and in that the significant part of it lies.

Railway development in Western Canada during the past year, is shown by the remarkable increase in the staff of the Canadian Pacific Railway in Calgary. At the close of 1909 the average number of employees in Calgary for the year was 700, and the pay roll, roughly estimated, amounted to $600,000. Last year the figures were more than doubled. The average number of people employed was 1,700, and the pay roll for the year was over $1,500,000.

At a meeting of the Structural Bridge Workers' Union last week at Winnipeg it was decided to ask for an increased wage, from 40 to 50 cents an hour, to go into effect May 1st. There are 170 members in the union.

During 1910 the city of St. Boniface, Man., expended $861,870 on building, compared with a quarter of a million during 1909.

The Successful Preparation of Concrete

Some Observations Upon the Main Principles to be Observed—Maximum Reduction of Voids — Incorporability — Uniformity in Grading[*]

By Harry Franklin Porter, C. E.

The preparation of concrete is an art requiring every bit as much exact knowledge, experience, skill and painstakingness as the preparation of steel. It is, if anything, a more difficult art than steel-making; for while the latter is carried on under fixed conditions and everything favors reduction of the process to a science, the preparation of concrete seldom takes place under conditions twice alike. In the first place, and from time to time, differing in composition, quality, size, and grading; and in the second place, the assembly of the various materials that go to make up the composition of concrete, and their final deposition as concrete, involves a continual readjustment of the modus operandi. To prepare concrete properly, therefore, it becomes very necessary:—

(1) To make a careful investigation of available materials before each and every use, involving an analysis to determine fitness, and a synthesis to fix upon proper proportions to insure the desired results; and,

(2) To see that every reasonable precaution is taken, in the several operations incidental to installation, to insure proper handling of the materials, both before, during, and after intermingling, until the finished product is in place; and thereafter to see that it is left to solidify under the most favorable conditions possible.

In order to undertake successfully—and successfully means intelligently—the preparation of concrete, it is of course first necessary to understand the principles involved.

It may be stated as the chief aim of concrete preparation to secure as dense and homogeneous a mass possible, by which it is meant that there shall be the closest possible contact between particles, and that the particles shall be so sized as to reduce the contained voids to a minimum.

Principles to be Observed.

To secure a dense concrete two things are necessary:

(1) To effect, by the manner of siznig and proportioning the inerts, a maximum reduction of voids; and,

(2) To fill all pores, interstices or voids remaining after the reduction as above with an elastic, insoluble and tenacious substance, which must first have the property of a liquid, so as to flow freely into place, secondly that of a glue, to unite all particles into a homogeneous whole, and thirdly that of becoming itself hard and stone-like.

It is not possible, no matter how carefully and to what extent the grading of inerts is carried, to therewith alone eliminate virtually all voids, any more than it is possible, in the familiar illustration in geometry, to divide a rectangle until there shall be no more to divide. Various inerts, as they come for use in concrete mixtures, have voids rougly as follows: Broken stone, one size, 50 per cent; broken stone two sizes, not greatly differing, 45 per cent.; gravel, one size, 50 per cent.; gravel of indiscriminate sizes as found naturally, 30 to 40 per cent.; natural sands, 30 to 40 per cent.; artificial (crushed stone) sands, 35 to 45. Thus, on the average, inerts—as they come naturally to hand—have from one-third to one-half of their volume air-space, or voids. Ordinarily, by combining broken stone or gravel with sand, in certain proportions, usually about two volumes of the former to one of the latter, it is aimed to reduce these voids, not entirely or even as much as possible or advisable, but only somewhat. This "somewhat" may reach as low as 15 per cent., if haply the finer inerts—the sand—are particularly well graded naturally; more often it is not less than 25 or 30 per cent. The balance, whatever it may be, is then offset, as best may be, with cement. A typical specification for such a mixture would read:

"The voids in the coarse aggregate are to be filled by an equivalent volume of fine aggregate, and enough cement is to be supplied to fill the voids in the fine aggregate with (say) 10 per cent., excess."

Or it might be stated more simply and specifically yet:

"The concrete is to be proportioned one part by volume of cement, to two parts sand, to four parts broken stone."

Of these two specifications, both of which are typical of average practice, the former is the more scientific; but neither is scientific enough to insure consistently good results, the object, presumably, we are after. In the first place, statement of the proportion of cement by volume measurement is exceedingly slipshod, for it ignores the fact that cement dry from the bag, cement packed down, and cement mixed with water, have volumes respectively that differ widely, and that it is the volume of cement with its requisite water that should be taken into consideration; secondly, that there is no accurate or real distinction between coarse aggregates and fine; and thirdly, that actual voids in aggregates is a very variable quantity, differing practically, not only with every job, but from day to day on the same job, even from hour to hour.

It is some improvement to state the proportions, as many engineers are now doing, as one part cement to so many parts aggregate, making no longer a distinction between coarse aggregates. But this even is not enough. A specification to be proper should state, first, the maximum size of inerts allowable; second, the maximum voids; and third, the quantity of cement paste necessary to effect a final filling of the voids and fulfill the requirement of a binder for all particles.

Maximum Size of Inert.

The maximum size of inert, that figures in the mixing of the concrete proper, is fixed usually by the conditions of practice; it is of advantage to have it as large as practical, since the larger the individual volume of the inerts the less, relatively, the superficial surface to be coated with binder. This follows from the fact that, whereas the volume of solids increases as the cube of the diameter, the surface increases only as the square. Three conditions, at least, work to limit the maximum size inerts:

(1) The incorporability; no particles should be used in the mix proper that will not readily merge with it.

(2) The width of members that are to be cast.

(3) The location and spacing of the reinforcement.

By the first consideration the size is limited to about two inches; and by the other two, on occasion, to as fine as ¼-inch, and seldom, in reinforced work is larger than ¾-inch practicable. Two-inch stone, even, are not easy to mix, and it is probable, for best mixing, not larger than 1-inch to 1½-inch should be used. Other grades of inerts are then to be supplied of such sizes and amounts as to effect a maximum reduction of voids. It is entirely possible to reduce the voids to 10 per cent. and even less, but probably 15 per cent. is a practical minimum. To fill the remaining voids cement must be largely relied upon.

Not many sizes of inerts are needed. Suppose the maximum is fixed at one-inch; then, as it has been found experimentally, and as it may be demonstrated analytically, the next size smaller should be, in order to fit easily into the voids of the maximum size, approximately one-fourth as large that is, in this case, ¼-inch, and there should be about half as much of them; the next size should be approximately one-quarter of the second—viz., 1-16-inch, and a volume of them equal to one-half of the second size or one-fourth the first, and so on, down to impalpable dust; but probably there will be more than four or five grades altogether, the finest grade comparing with cement in fineness, finer than which it is scarcely possible to go. This law of grading, if represented by a curve, would assume the form of a parabola, having its origin at the intersection of zero size and zero proportion, and approaching coincidence with the horizontal at the intersection of the 100 per cent. ordinate and the maximum size abscissa. It will be found of this parabola, that the intersection of the 50 per cent. ordinate and one-fourth maximum size abscissa, and the intersection of the 25 per cent. and the 1-16th size, and so on as outlined above, will fall in it or near it.

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[*] Extracted from paper read before the National Association of Cement Users.

By use of such a curve, and the separation of a combination of inerts proposed for use into several grades down to dust, jotting the results alongside the standard curve for comparison, the deficiencies can be at once recognized when the extra proportion of any one or more sizes, or the proportion of a size not present, may be readily calculated, and the deficiencies corrected.

If there is an excess of coarse stuff the curve will be too flat; if an excess of fine, too high. An excess of fine is particularly obejectionable in that it crowds the cement grains and prevents their working properly; moreover, it requires an excess of cement, over and above a properly graded aggregate. An excess of cement is also required when there is an excess of coarse stuff, but, unlike the other condition, there is no crowding of the grains; the cement still does not function properly, in that it is congested in the large voids instead of being distributed in thin films and fine points, forming as it were an interlacing meshwork, entwining all particles, but this condition is not so bad as the former.

Grading Must be Uniform.

Best results obtain when the grading is uniform, from maximum to dust, but with no more than 10 per cent. of the finest grade, which approximates the cement in size and may be regarded as replacing so much of it as finest filler. The cement, then, when made into a fluid with water, will have only to coat all particles with a thin film and to bridge the few small remaining interstices. Nothing but a liquid can perform this office; this is an important point and will be dwelt upon hereinafter.

Another point: It is well not to have the sizes too close together, as for instance, to have a mixture of 1-inch and ¾-inch stone, for the reason that ¾-inch will crowd the inch, preventing it from assuming the most compact form; in fact, even so large as ½-inch will crowd the larger size. The desideratum is (1) that the maximum size should be free to assume its most stable configuration, which is when all particles are in as close contact as possible; and (2) that the next smaller size should just be large enough to neatly fill the maximum interstices, and that there should be just enough of this size to fill all these interstices. Similarly, the next smaller size should be such in dimension and amount as to effect a complete filling of the next largest interstices, and so on.

If this law of grading is observed, it will be found that the final total volume about equals the original volume of the maximum size, and that mixture will be the most dense of which this is the nearest true.

This points a practical way to determine upon the best proposition—to wit, to try a number of different combinations of the materials available, and to use that one which gives the least volume, or the one nearest the size of the volume of maximum size particles alone.

Needless to state, almost, the test mixture should be so soft as to quake like jelly, and be ready to flow, for the above indications as to quality to be apparent. Similarly, during the deposition of concrete, if it is of a proper liquid or semi-liquid consistency, the trained eye of the foreman or supervisor can keep track of the quality of the mixture almost as accurately as an automatic proportioner, supposing there were such an instrument. As a matter of fact, there is no satisfactory substitute for the trained eye of the installer, nothing that can detect so quickly and accurately any variations in the composition of the mixture, as occur often many times in a single day on the average concrete job, due sometimes to variations in the material, again to mistakes of the workmen.

Test Accuracy by Weighing.

Another way to gauge the accuracy and sufficiency of the grading is by weighing. That mixture, obviously, which weighs the most relatively is the densest. If the solidity of the concrete were absolute, that is, if the voids were completely filled, its weight would be in the neighborhood of pounds if of limestone, and 180 if of trap. A quartz concrete, thus, that weighed close to 160 pounds, would be about as dense as it would be possible to make it. A few pounds, always, are to be allowed for shrinkage, say two per cubic foot for moderately wet mixtures, so that if measurement and weight are taken wet, this correction should be applied before estimating the density. There will be no less, too, by evaporation, to take into account, if the concrete is to be allowed to harden freely exposed to the air. If wet-blanketed, then there will be practically no loss from this source. A weight of 160 pounds for a quartz-concrete, hardened under favorable conditions of wetness, with shrinkage allowed for, can scarcely be improved upon. It means a solidarity of 97 per cent., or a reduction of voids to three per cent. A concrete this dense will be found practically impervious to water, even under considerable head, indeed to the limit of its strength. What more could be asked?

The size of inerts is not necessarily limited to the maximum stated, if conditions permit as large stone as it is convenient to handle may be intermingled with the mass, so long as there is always an abundance of concrete—which in this case may be regarded as a coarse mortar—to completely cover them. Such stones may be called, to distinguish them from ordinary inerts, bulk-swellers.

Bulk-swellers should not be less than four diameters larger than the largest inert, and preferably still larger, in order that there may be no doubt as to the fine material slipping into the voids, in case especially if the volume of bulk-swellers is sufficient to cause the concrete-proper to occupy the relation to the void-filler; but they should in no event be less than four times larger, lest they act merely to displace or crowd the coursest inerts, rather than an equivalent volume of all inerts. If the bulk-swellers are so sized, a volume of them may be used equal approximately to twice the volume of the concrete-proper. Of course, practically, bulk-swellers being generally added subsequently and individually, relative volumetric considerations scarcely figure, but—as stated previously—coarser particles may be added up to the point where there ceases to be a sufficiency of fine material to thoroughly imbed them.

When large stone are introduced into the mass, great care must be exercised to see that they are well distributed, with a comfortable margin of soft material all around, above and below each piece. The danger is, of course, that the large stone, particularly if regular in shape, will bunch, either across or up and down, introducing thus planes and weakness. It is also important that the stone be clean and thoroughly wetted, lest the adhesion be deficient.

The shape of bulk-swellers is an important consideration likewise; cubical or square-faced blocks are less desirable than irregular or well-rounded ones, for square edges act like so many wedges, tending to cleave the mass as in hardening it shrinks around them. Rounded stone, on the other hand, imbed themselves more naturally, the mass in shrinking tending to conform to their contour; irregular shapes tend to key themselves in, and to prevent, rather than induce, cracking. Flat stones are less desirable even than cubical ones, as their tendency to induce splitting is still more pronounced. These objections on the score of shape constitute in fact the greatest drawback to the use of large bulk-swellers.

Use of Large Bulk-Swellers.

An interesting example of the use of large bulk-swellers is afforded in the construction of the piers and abutments for the new concrete arch, bridge across the Rocky river, at Cleveland, which outranks the famous Walnut Lane bridge spanning the Wissahekon in Fairmont park, Philadelphia, both in span and in height. In this instance huge chunks of rock, as large as could be swung into place with a derrick, were introduced into the mass at frequent intervals, being first cleaned, dusted and wetted. Advantage was taken of these stone, at the conclusion of any period of operation, when there was to be a break of some little duration, by placing them so that about half protruded, thus providing an admirable key for the subsequent work. It is an interesting fact that, although frequently square-faced stone were used, no unfavorable shrinkage action showed itself; which would indicate that most of the shrinkage must take place while the concrete is still plastic enough to conform to the rigid outline of the contained block without separating. Hence the tendency to induce cracks, as pointed out before, may not be so serious a matter as offhand might be supposed.

There is another advantage in the use of bulk-swellers, of irregular shapes especially, rounded ones less so, namely, that they act also as reinforcement, forming here and there, throughout the mass, so many rigid keys locking the parts together, and in this way enhancing, no doubt, both the comprehensive and tensile strength—if not very much in the long run—at least an appreciable amount on short time. Of course, just how much strength will be added in this manner depends largely on the character of the stone itself. This enforces the necessity for a good quality of stone, always, for concrete mixtures.

Bearing on this point, investigations made in connection with one of the bridges recently constructed by the city of New York, to ascertain how the strength of concrete might be increased so as to act as an adequate filler and stiffener to some cast pedestals, are of interest. It was found by the addition of a certain number of cut nails or spikes per cubic foot of concrete the crushing strength, and the tensile correspondingly was increased enormously, one series of tests giving results as high as 18,000 pounds per square inch, or nearly eight times the ordinary strength.

Similarly, by the plentiful intermingling of large, irregular shaped, more or less elongated, tough bulk-swellers, to a mass of concrete, it would appear that the strength must benefit no slight amount. In reinforced concrete work, especially, this principle might well be taken advantage of, providing of course conditions are favorable to it, to the end that the concrete act further with the steel to resist tension, thus increasing the actual strength of the whole member. Indeed, it is not at all improbable that, in the no very distant future, reinforcement of this nature, that is, supplying resistance to particles throughout the mass, by introducing here and there short pieces of steel, on the tensile side especially, will come into use, thus making concrete a more truly homogeneous structural material. The same principle might also be taken advantage of in columns, in order to keep down the girth and avoid the necessity of steel cones.

All concrete may be looked upon as a combination of mortar with bulk-swellers. Thus the conventional 1:2:4 mixture might be regarded as composed of one part 1:2 mortar and four parts bulk-swellers. The correctness of the rule as to the proportion of bulk-swellers allowable—to wit, a volume of them equal to twice the volume of fine material, is now apparent. What, then, it may be asked, is the practical use of regarding the bulk-swellers separately? Just this, that they play no vital part in the proper balancing of the inerts from coarse to fine to secure a dense concrete—it is the fitness, largely, of the mortar in any concrete that determines its density.

Standard Concrete Mixture Feasible.

This would indicate the feasibility of a standard concrete mixture, one which might be used for any and all purposes, differing only in the proportion and size of the bulk-swellers added. It would be only necessary to agree upon the most suitable and convenient maximum size inert in the concrete-proper. Larger than one-inch would scarcely be possible, as already pointed out; probably one-inch or . inch would best satisfy general requirements. The preparation of good concrete, then, would resolve itself down to the selection of suitable finer grades of material to compare with the maximum grade determined upon, even according to the diagram of grading hereinbefore outlined. Efforts in the direction of economy in this case, instead of expending themselves in such unworthy ways as skimping the cement, would be confined to improving the grading (which truly economizes on the cement by increasing the amount of it required to produce a given result, not to mention the many other advantages of a scientifically graded mixture), and to incorporating with the mass, either during mixing or thereafter, as many and as large bulk-swellers as conditions favor and judgment approves. If bulk-swellers are added during the mixing, they should be held out until the rest of the material is pretty well intermingled. No specific limit need be set as to their amount relative to a stated volume of fine material (as measured mixed), except to rule that no more of them shall be added than can be readily incorporated. An approximate ratio has already been given, but this may not always indicate the true proportion, more or less; judgment on occasion is the best guide.

A Progressive Plaster Products Firm

The Ritchie Contractors' Supply Company, Bower Building, are operating a plaster mill in Vancouver, in which they manufacture "Peerless" prepared plaster, fibred plaster and plaster finishes. They also manufacture gypsum fibred plaster blocks, and plaster boards. The plaster block has been used in the eight-storey Pacific Building (W. M. Somerville, architect), erected for W. A. Bauer, and also on five provincial school buildings; they are likewise supplying blocks for the new Mission Building in this city, and have several large contracts for other buildings in Vancouver, Victoria, and New Westminster. Since the opening date the plant has been in constant operation, as well as the plaster mill. The firm are also installing the Polly system for manufacturing hollow fireproof partition tiles, and as their facilities for shipping are the very best, having rail and water connection, the firm are justified in looking forward to a large demand for their various products. The Ritchie Company's attractive business announcement appears on another page of this issue.

The Artificial light required in concrete buildings is considerably less than needed in buildings of slow burning mill construction according to the experience of Mr. Leonard C. Wason of Boston. This is due to better reflection in the concrete buildings from the white walls, ceilings and columns. The better natural lighting in concrete buildings due to reflection and the large window areas has been frequently commented upon.

Cost of Construction at Ottawa

No Important Changes Expected this Spring — Eight Hour Day to be Instituted on May 1st

Ottawa, January 20, 1910.

The general opinion of the architects is that the building operations will cost about the same this spring as last. So far there are no changes in the prices of materials; brick, cement, lumber and steel all remaining at the same prices as prevailed all last summer. It is not expected that there will be any changes in lumber, although the cheaper qualities may be a little firmer. The only change anticipated in the cost of labor will be in connection with the contractors; the eight-hour day begins on May 1st. The agreement was signed last May for five years, the eight-hour day coming into force this spring. There will then be an increase of two cents an hour, making it 52 cents. It is now 50 cents. This will not make much difference except that the assistants to these trades will also be compelled to work only eight hours, because there would be nothing for them to do for the remaining hours. It is expected that all the other trades will remain at the same wage.

There are considerable workmen unemployed just now as is always the case in mid-winter. However, there is more winter building operations than in other years at this time.

The Ottawa Improvement Commission has a large force of men employed demolishing the buildings along Sussex street which is to be converted into a driveway. The lumber from these will be used for the most part in erecting houses for some of the commission's employes in Rockliffe as well as a large shed which is to be used for storing the commission's machinery, etc. The stone from the buildings will be crushed and put on the roadway. A large quantity of old brick will be sold, probably by tender.

There is still nothing definite with regard to the annexes proposed for St. Luke's and Rideau Street hospitals. The boards of both institutions are seeking to finance such additions, but it is too early to say with what results. In each case the enlargements will cost about $150,000, as planned.

Whether or not W. F. Tye will be engaged to co-operate with City Engineer Ker to prepare a general plan for railway entrances into the city, still remains undecided. The city council has referred the matter back to the Board of Control and that body has again recommended his appointment.

The Ottawa Builders' Exchange was addressed recently by Mr. E. T. Nesbitt, Quebec, President of the Ontario National Association of Builders. There is every indication that the local exchanges will be well represented at the convention of the Association, which is to be held in Winnipeg, February 15-16. A big delegation is all the more likely as the meeting will be held during the week of the curling bonspiel.

City Engineer Ker, of Ottawa, is reported to have received a tempting offer from Vancouver, B.C. It is understood that the federal capital will do its best to retain his services.

An Ottawa architect stated last week that from the intimations he has already received more large commercial buildings will be begun on Sparks street this season than last year. This is a particularly big statement, because last year was a record for building on this street.

The proposed plaza over the canal between the Grand Trunk station and Chateau Laurier at Ottawa is again being discussed by the authorites and a plan is stated to have been prepared.

An Explanation of Ottawa's Paving Contracts

Ottawa, January 18, 1911.

Editor Contract Record:

In your issue of January 11th, on page 38, there is an article which states that "An Ottawa Alderman declared last week that when the City Engineer wanted to obtain the contract for small blocks of pavement he tendered low, and when he did not want to take contracts for large blocks of pavement, he tendered high."

This statement was made by an Alderman during the recent election campaign, and as the matter is pretty well understood here, no attention was paid to it by me at that time, but when the statement appears in the Contract Record and is published broadcast throughout Canada, it is time to take some recognition of it, and in view of your recent discussion of the day labor question, the following facts may prove interesting to your readers.

In April last tenders were called for the paving of the south end of Bank street and the eastern section of St. Patrick street. These streets are main thoroughfares and compare in their relative location to Yonge and Queen street east in Toronto. Both streets have double street car tracks. Bank street has a four-minute service, that is, a car every two minutes, and St. Patrick street an eight minute service. The car service had to be maintained as well as the vehicular traffic during construction. As the Exhibition Grounds are at the south end of Bank street, it was advisable to have the pavement laid complete for the Exhibition, which opened September 7th. Consequently the penalty for overtime was made $50 a day on Bank street, the penalty for non-completion in time for St. Patrick street being $30 a day.

The pavement on both streets was to consist of stone setts on 6 inches of concrete in the track allowance, with 8 inches of concrete under the rails, the sides of the street being paved with 2½ inches of ashphalt on 6 inches of concrete, with concrete gutters.

The prices received were as follows:—

Bank Street.	
Ottawa Construction Co.	37,989.00
Union Construction Co.	47,673.00
Barber Asphalt Paving Co..........	$37,565.00
City Engineer	47,673.00
St. Patrick Street.	
Barber Asphalt Paving Co.	45,750.00
Ottawa Construction Co.	49,495.00
Union Construction Co.	50,750.00
City Engineer	59,522.70

You will note the City Engineer's tenders were much higher than the other contractors and considerable comment was made at the time.

What has been the result? The Barber Asphalt Paving Co., an old and experienced company, being the lowest tenderer, were awarded both contracts. Instead of finishing the pavements on time, neither of the pavements were finished when the work was suspended on account of frost in November. They have not been accepted from the contractors, and in my opinion, a considerable section of both pavements will have to be relaid in the spring, for despite the most rigid inspection, the work is not satisfactory to this department or to the ratepayers. Both streets were torn up all the summer, causing considerable loss to the merchants on the street.

The penalty for overtime is at present about $2,500, while I have it on good authority that the contractors have lost betwen $6,000 and $7,000 on the work. Under these conditions I think my tenders were sane and reasonable, as they provided for good work and prompt completion.

Later on in the season, tenders were called for nine other streets, the three companies and the City Engineer tendering on each, and there was very little difference in the prices. The Ottawa Construction Company were awarded contracts for four and the Barber Company two, while the City Engineer was awarded three.

Fair prices were put in for the three contracts awarded to this department and the work was carried out promptly on time, giving entire satisfaction to the ratepayers; nor have I heard any criticism from the contractors as to the quality of our work.

The civic asphalt plant was installed in the spring of 1908, to keep in repair the various pavements laid under the day labor system by the city as well as pavements laid by contractors upon which the guarantee has expired, and for the purpose of laying new pavements.

The installation of the plant has resulted in preventing combines and in reducing the cost of asphalt pavements from $2.50 to $2.75 per square yard, to $1.80 to $2.15 per square yard, according to the type of pavement laid, and in the past three seasons it has paid for itself twice over.

There is no disposition on the part of the engineering department here to cut prices to such an extent that good work cannot be done by the contractors with a fair profit.

Yours ver truly,
Newton J. Ker,
City Engineer.

Victoria City Engineer's Annual Report

The annual report of Mr. Angus Smith, City Engineer, Victoria, B.C., contains a number of items of interest. The report shows that the amount of sidewalk work completed was 25.48 miles, compared with 13.45 in the previous year; 4.65 miles of sewers were laid, as against 6.40, and the amount of curb and gutters laid was 10¾ miles, compared with 3½ miles for the previous year.

Pavements laid—Asphalt pavement laid on St. Charles, Linden, Southgate, Rockland, Fernwood, and Bastion streets, 37,500 square yards, or 2.10 miles; wood block pavement laid on Yates, Douglas, Herald, Belleville, Humboldt and Gordon streets, 37,280 square yards, or 1.20 miles; concrete pavement on Broad and Pandora streets, 4,100 square yards, or one-sixth mile; tar macadam laid on Oak Bay avenue, North Park street and Princess avenue, 1.17 miles; macadam laid on Spring, Catherine, Langford, St. Lawrence, Michigan, Rudlin, Fernwood and Gladstone streets, 42,506 square yards, or 2.20 miles.

The following is the actual and estimated cost per square yard of some of these latter pavements:—North Park, tar macadam estimated cost $1.25 per square yard, actual cost $1.00; Broad street, concrete, estimated cost $2.80 per square yard, actual cost $1.84 per square yard; Herald street, wood block, estimated cost $3.75 per square yard, actual cost $3.47 per square yard; Yates street, wood block, estimated cost $3.75 per square yard, actual cost $3.31 per square yard; Government street, wood block, estimated to cost $3.75 per square yard, actual cost $3.62 per square yard.

With the assistance of the public works department surveys, plans and specifications were prepared and the contract let for the construction of the Dallas road sea wall at an estimated cost of $75,000. The groins were constructed on Ross Bay beach, for the purpose of protecting the cliff oposite the cemetery. The groins appear to give the protection intended and these are probably the first experiment of the kind on the coast.

The following material was purchased in the year 1910: 12,108 of gravel, 9,291 yards of sand, 21,490 barrels of cement, amounting to $79,669; also 1,700 yards of crushed rock amounting to $30,000, making a total of $[illegible]

Mr. W. H. Browne, a prominent consulting engineer, formerly of Montreal, died last week at Brooklyn, N.Y., at the age of 61.

Civic Improvements at Montreal

About Fifteen Million Dollars to be Expended—Building Trade Continues Active — Interesting Comparisons

Office of the Contract Record,
Montreal, January 20, 1911.

Notices were sent out recently for the re-opening of the sessions of the Canadian Society of Engineers with a paper on "Recent Advances in Machine Tool Construction," by Mr. Thomas Reid, of the John Bertram & Sons Company, Dundas, Ont. The cards did not arrive, however, until the morning of the lecture, and this, combined with the inclement weather, caused an attendance of less than a dozen members. It was therefore decided to postpone the reading of the paper until February 9, when it will be read by Col. Bertram, Mr. Reid being in Europe. Col. Bertram will greatly extend the scope of the paper by then, and the great changes which have been made in tools and their manipulation during the past ten years should prove material for an interesting address.

About thirteen million dollars will, it is expected, be spent on civic improvements during 1911, and over two millions on the harbour improvements. Although no official information can be given for at least a month, it is understood that work on the construction of the St. Lawrence tunnel for the new central terminal station will be commenced in March.

Mr. Chausse, the Montreal Building Inspector, is amused at the claims of other cities to show larger building returns than Montreal for the past year. In 1909 Montreal's building permits totalled $7,800,000. Last year the total of permits issued amounted to $15,815,859, but this of course was not the actual total of work done.

"Winnipeg claims many other things besides the value of permits," he said this morning. "Suppose we do the same. In the first place, for fear of assessment or for other reasons, people seldom quote the total value when applying for a building permit, and it is permissible to add at least twenty per cent. for these reasons, say three millions. Then outside the actual permits we have the harbour improvements, amounting to four millions, and the railway rwoks—bridges, subways, etc., of not less than two millions. There are two annexed wards which do not have to apply for building permits, but which have spent at least a hundred thousand, and at least a hundred and fifty thousand has been spent on civic buildings. This means a total of over $25,000,000, without counting municipalities within our boundaries, viz.: Westmount, Outremont, Maisonneauve and Verdun, which between them have spent not less than four and a half millions, bringing the total to over thirty million dollars. Next year this will be greatly increased. 1911 will be the greatest building year in Montreal's history."

Prices keep fairly firm. There is a good market for bricks at $10, $15 and $18 per thousand; cement is steady at $1.00 f.o.b. Montreal in car lots, with 5,000 barrel orders fetching lower prices; metallic laths are 25c straight and 30c. bent. For paints and oils there is a good demand with a fair market; white lead, $6.50 to $7.00; linseed oil, high, at $1.09 raw and $1.11 boiled, and turpentine fairly steady at from $1.08 to $1.10 a gallon.

The building trade is still brisk for the time of year. The foundations for the [illegible] Building are beginning to take form and many other of the new buildings look as though they will be ready [illegible] May, which is the general moving time here.

Mr. W. H. [illegible], the [illegible] of the [illegible] made a [illegible] of the Maritime Provinces, [illegible] a call to each of the firm's customers. He has now left for a similar trip through Ontario and the West, intending to interview [illegible] in Canada. He will therefore be absent from Montreal for a considerable time.

Personal and General

On January [illegible] Mr. C. R. Woodruff, secretary of the National Municipal League of America, delivered an interesting address at Montreal under the auspices of the City Improvement League on "Co-operation in City Planning and the Function of Business Bodies in Civic Betterment."

The annual general meeting of the British Columbia Land Surveyors was held recently in Vancouver. The board of management elected for the current year consists of: E. A. Cleveland, president, W. S. Gore, vice-president; S. A. Roberts, secretary-treasurer, and E. B. Hermon, G. H. Dawson, J. H. McGregor, S. C. Green, N. F. Townsend, and (ex-officio) E. B. McKay, surveyor-general, members of the board.

According to a dispatch from Calgary the Exshaw Cement Company's plant was sold last week in the sheriff's office to the Canada Cement Company for upwards of one million dollars.

Mr. Wiliam Price, of Seattle, general manager of the Western Steel Corporation, announces that the construction of a $500,000 plant will be commenced near Sunbury, B.C., by April 1st.

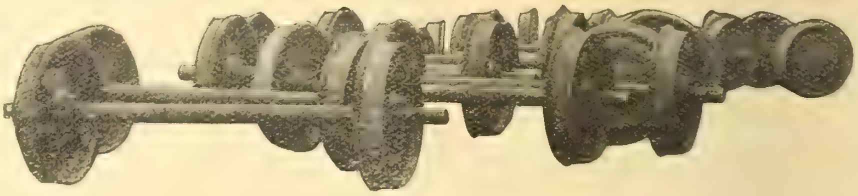
Mr. R. L. Parsons, of the Parsons Construction & Engineering Company, Regina, returned recently to the latter city after a visit to Calgary, where his firm has the contract for a large overhead bridge. The Parsons Company have in hand some of the largest public works contracts in the west.

The annual meeting of the Architects' Association, of Victoria, B.C., was held last week. The newly formed association numbered about 20 members.

The survey is nearly completed for the new water supply for the town of New Glasgow, Nova Scotia, and an important meeting of the engineers in charge will take place within the next few weeks to decide upon the type of piping most suitable for the conditions. About twenty years ago, when the question of a water supply was first dealt with, a steam pump was installed, but with the growth of the town a larger and better supply of water has been found necessary. It has therefore been decided by the municipality to tap the waters of McLellan's brook at a point about six miles from the town limits utilising a number of small lakes in the district to form a reservoir, and this water will be brought to the town by gravitation. There will be sufficient fall for fire presure and the old pump will then go out of service with the completion of the new system.

The Trussed Concrete Steel Company of Canada are starting the erection of special buildings at Walkerville for the manufacture of steel sash. The initial capacity of the plant will be 4,000 square feet a day, but provision will be made for doubling this in the near future.

Mr. Geo. E. Bell, the son of Mr. Jas. A. Bell, of St. Thomas, Ont., has been appointed manager of the Dominion Bridge Company's office and plant at Winnipeg. He will have charge of all the company's business in Western Canada. Mr. Bell was educated at the Collegiate Institute at St. Thomas and McGill University, Montreal.



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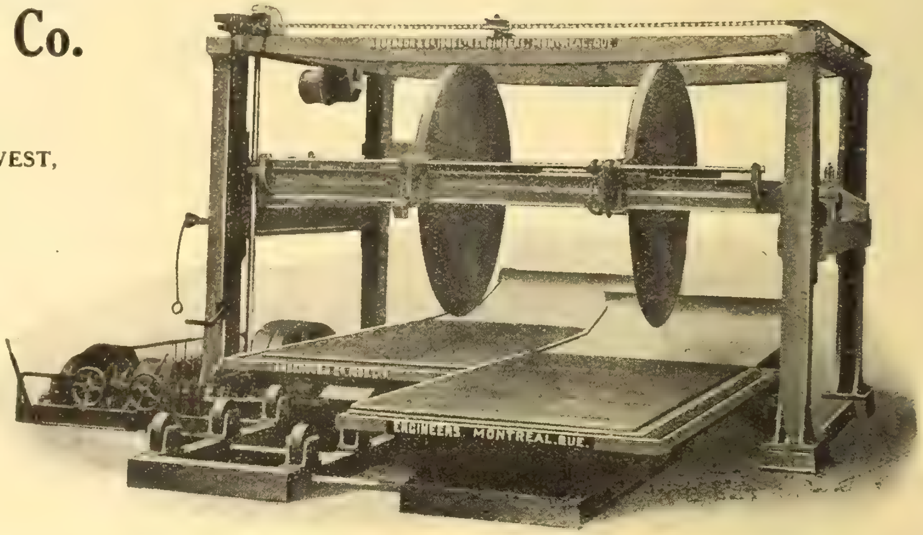

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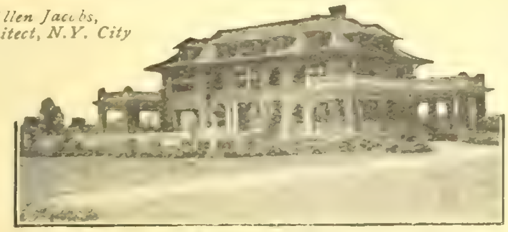

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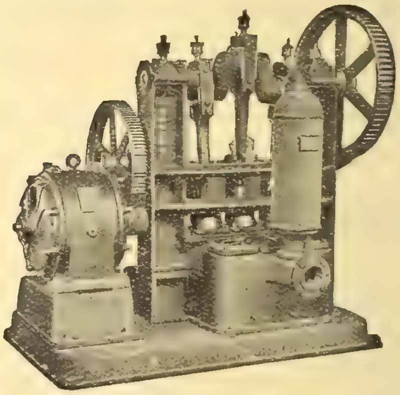

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No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock bricks	10.00
Wire cut bricks for foundation work.. ... ...$10.00 to	11.00
Porous terra cotta bricks	15.00
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WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches......	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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(Installed in Toronto.)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.
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Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.
Vitreous Tile—All sizes, according to color, 55 to 65 cents.
Glazed—White, 6 x 3 inches, 55 cents per square foot.
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¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

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Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
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Raw Linseed Oil, in barrels, $1.12 per gallon of 9 lbs.
Turpentine, in barrels, $1.05 per gallon.
Pure Linseed Oil Putty, 25-lb. tins, $3.75 per 100 lbs.
Pure Linseed Oil Putty, bulk, in barrels, $3.25 per 100 lbs.
Pure Red Lead, dry, $5.00 to $6.00 per 100 lbs.

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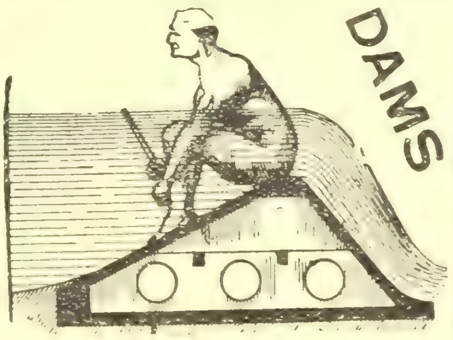

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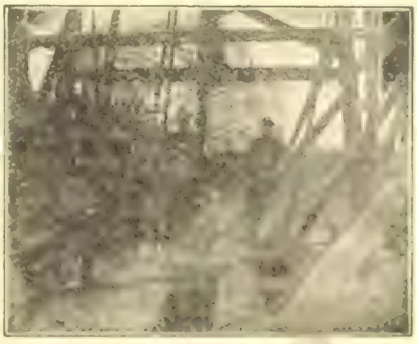

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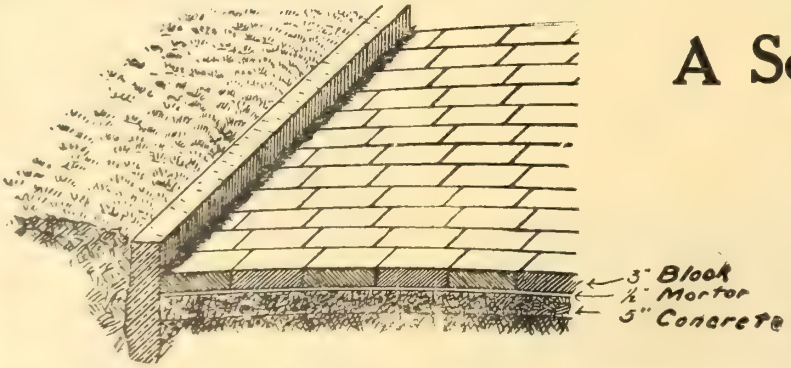

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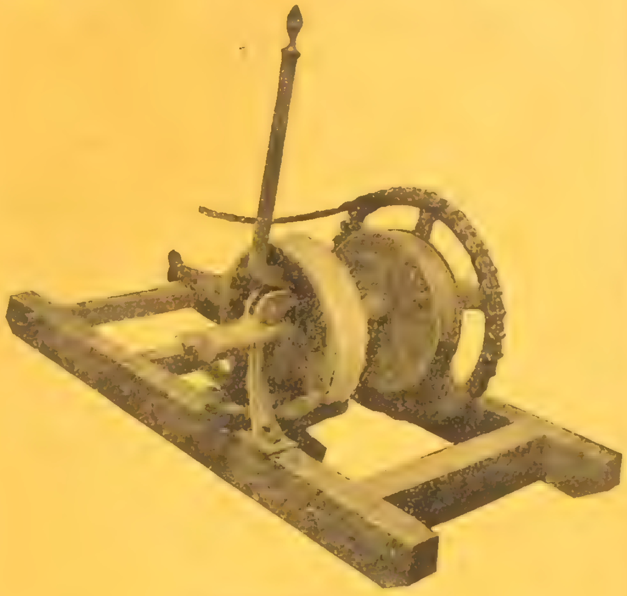

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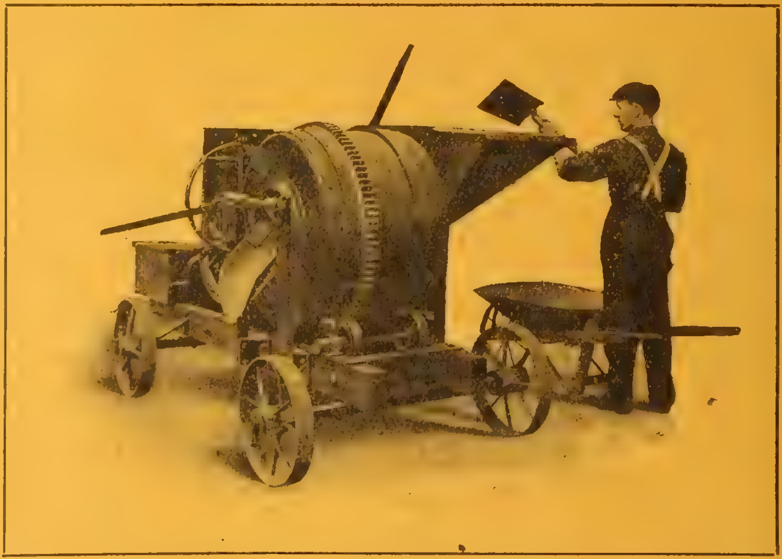

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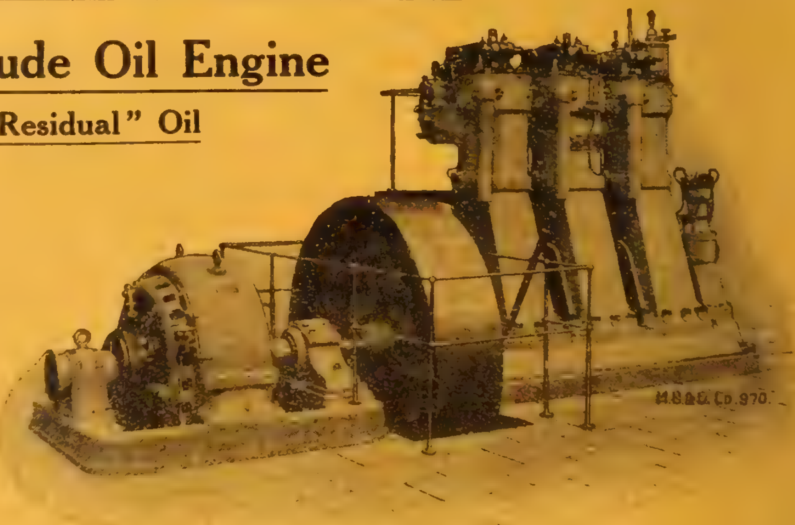

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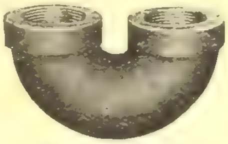

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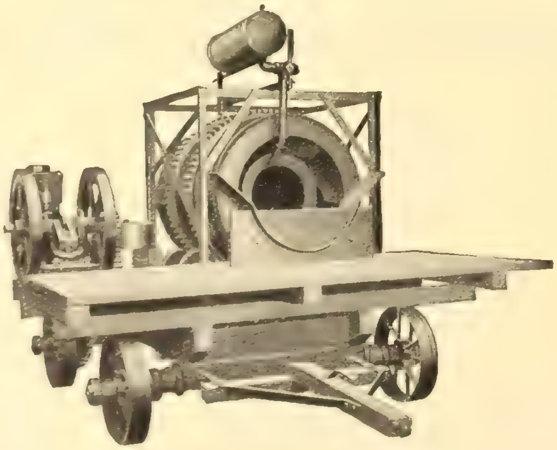

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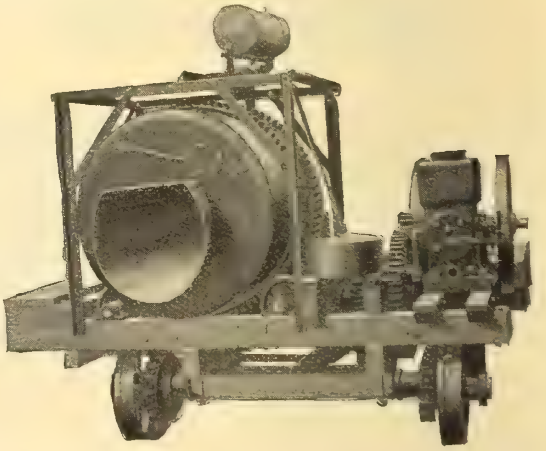

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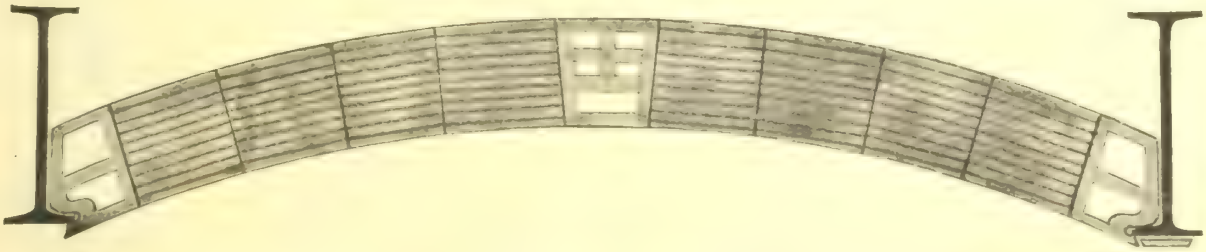

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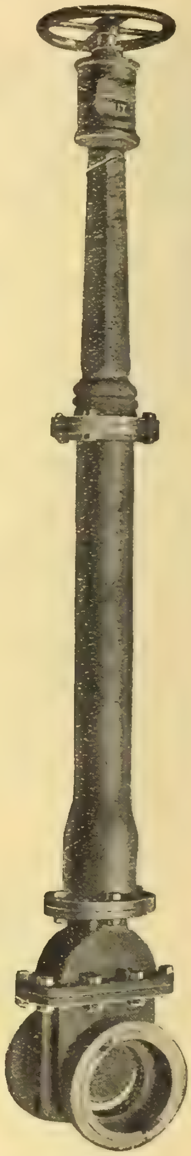

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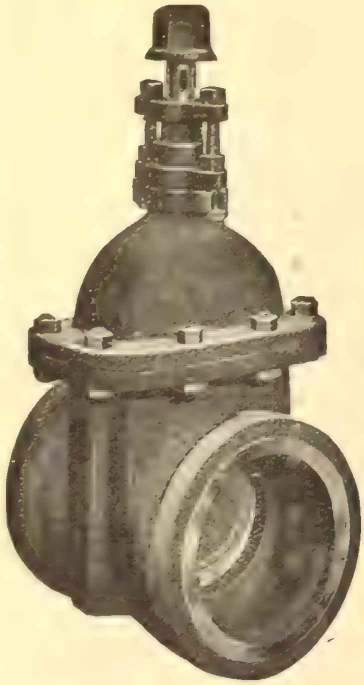

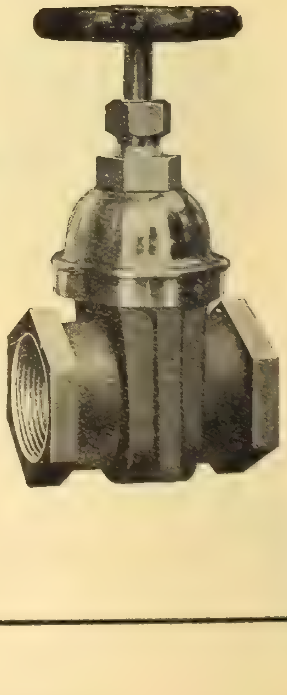

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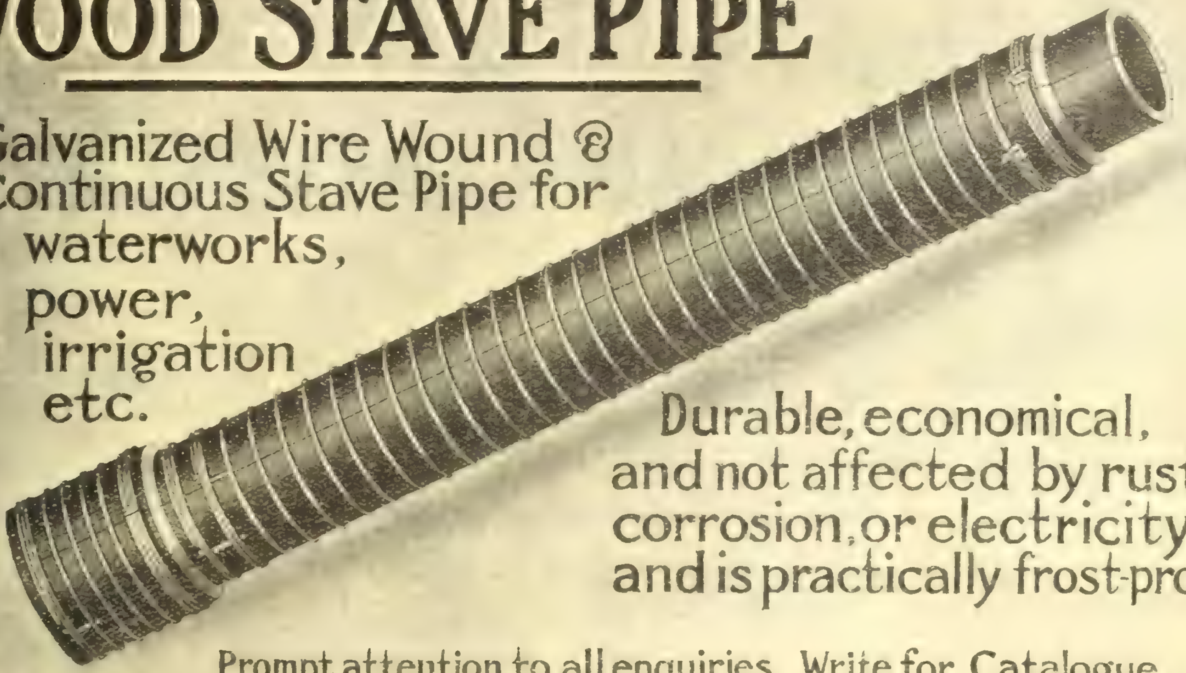

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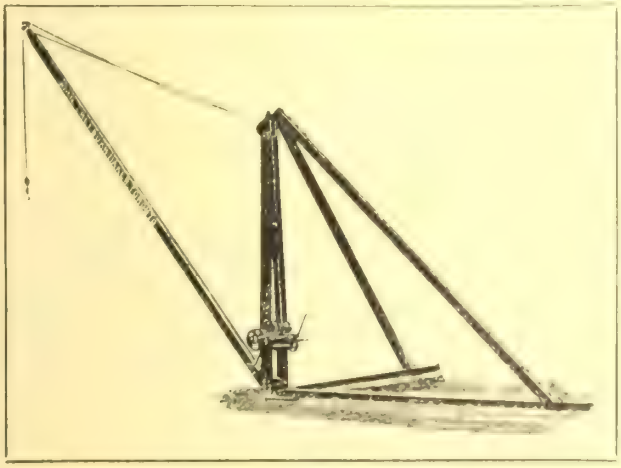

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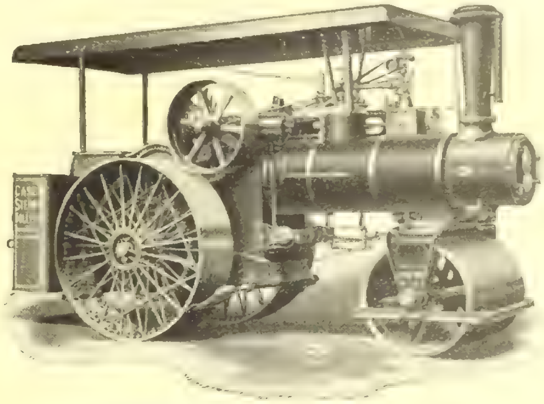

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They are Perfectly Sanitary
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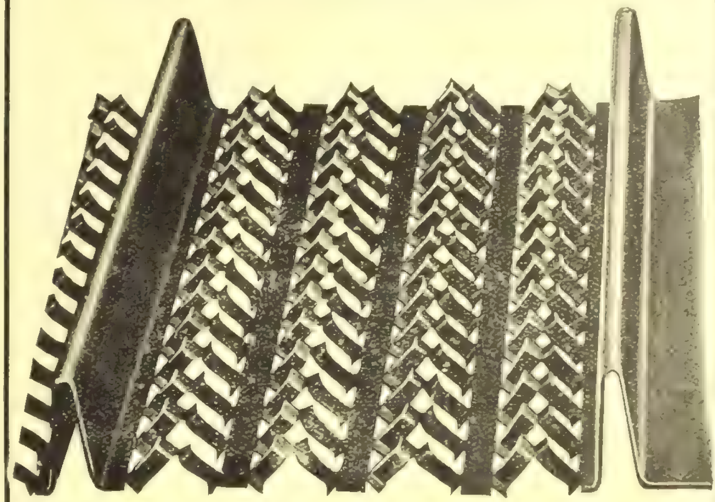

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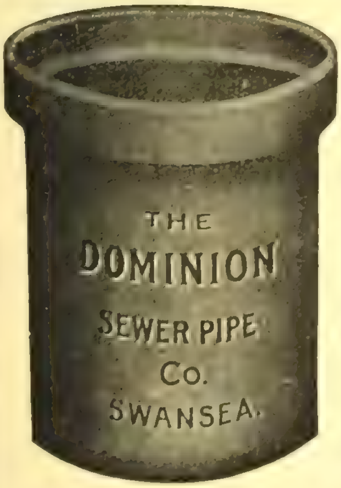

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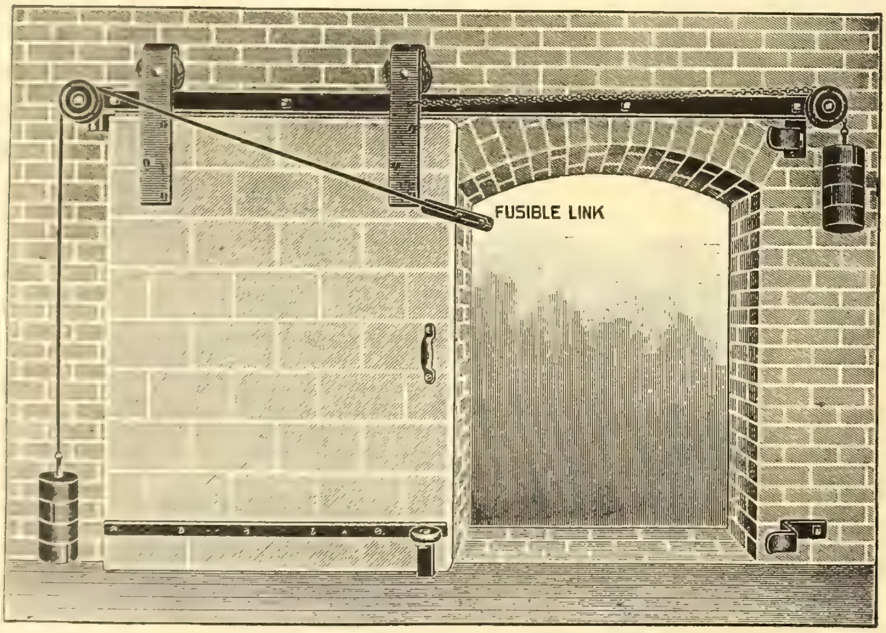

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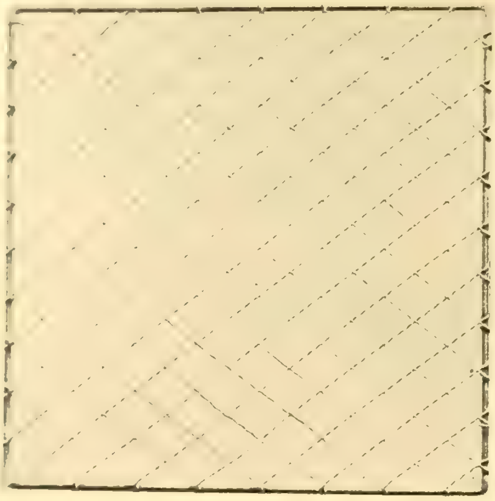

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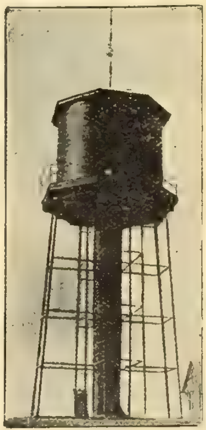

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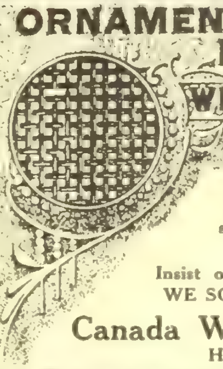

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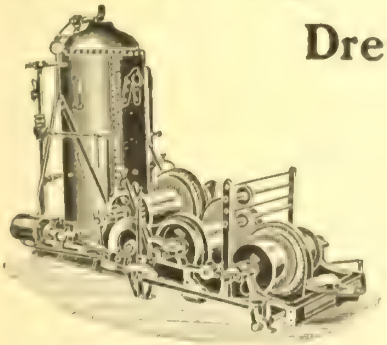

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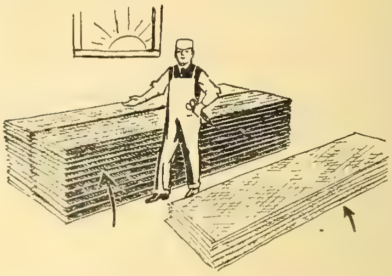

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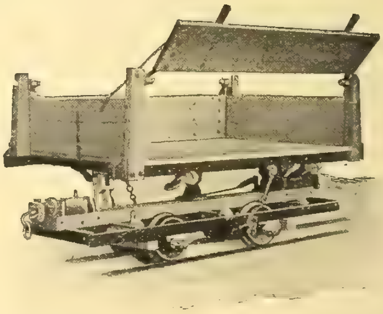

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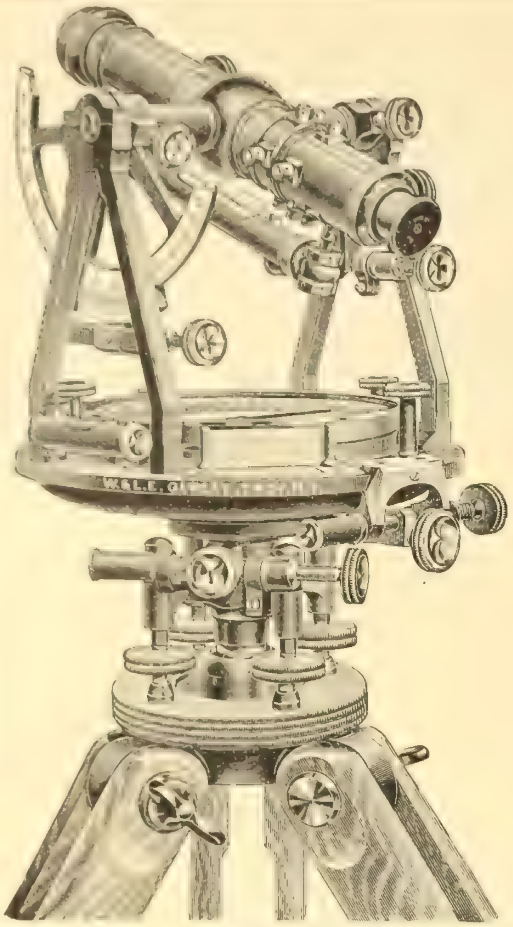

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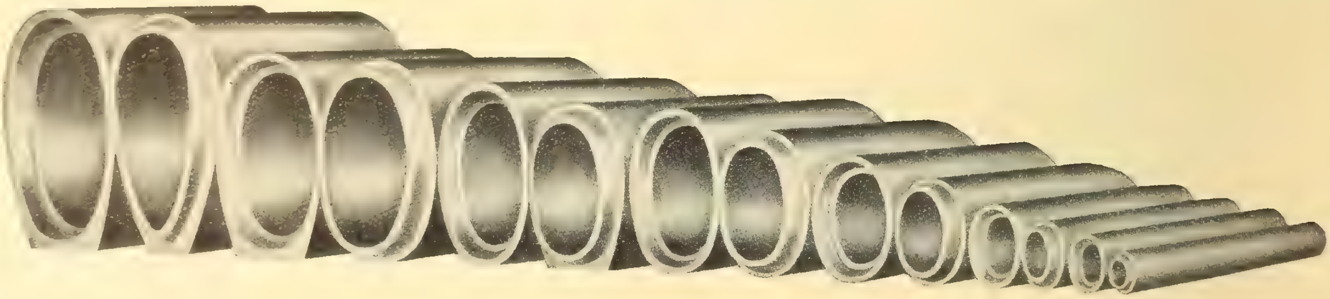

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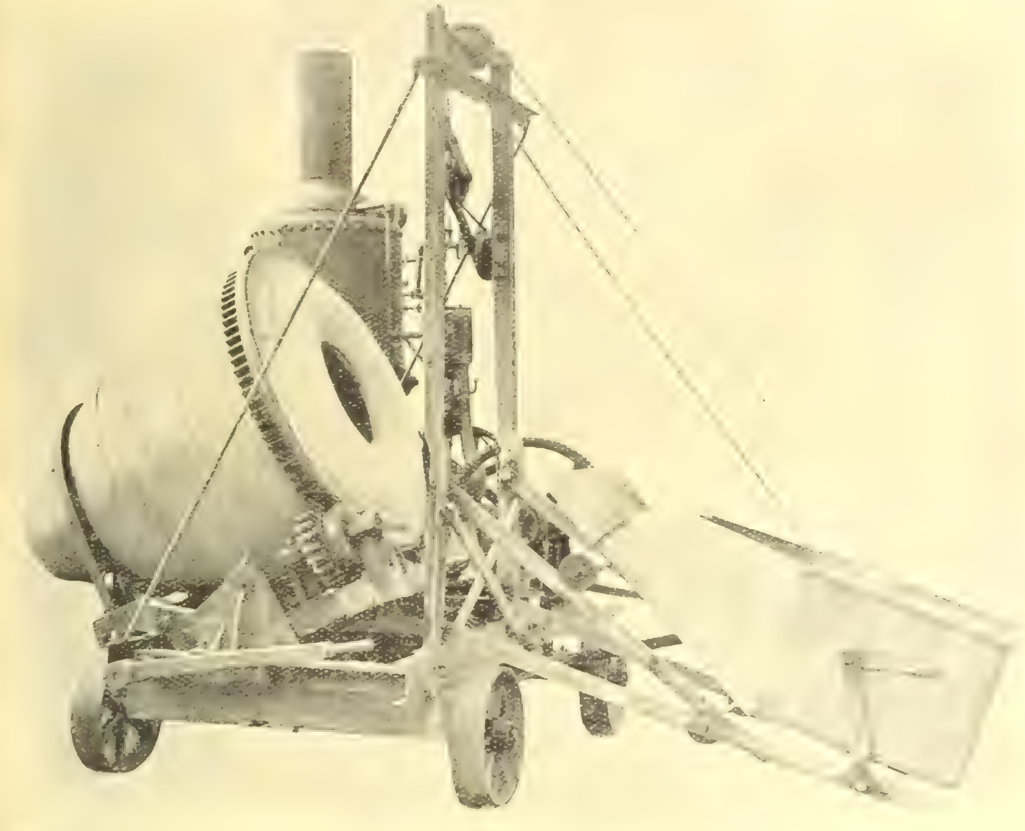

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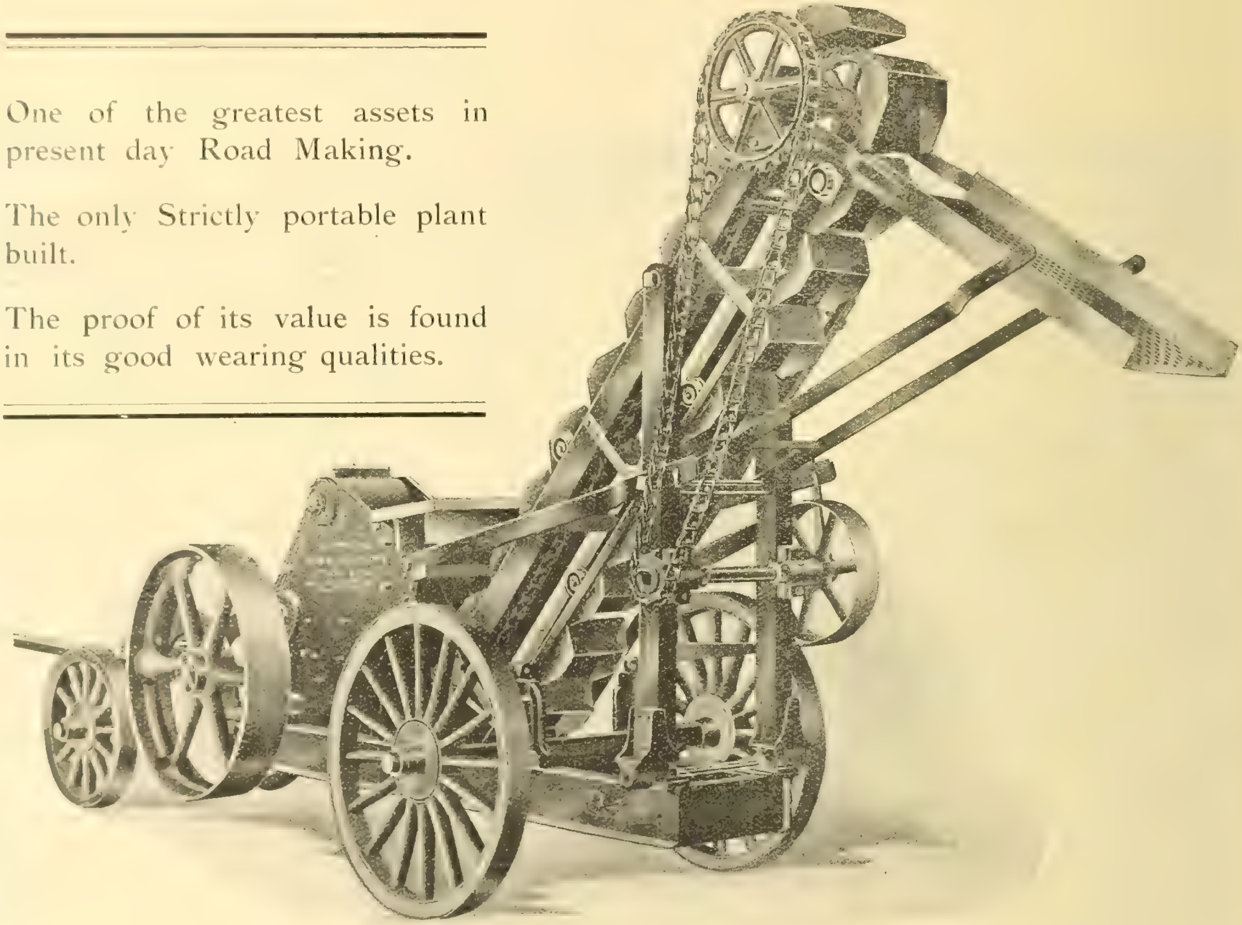

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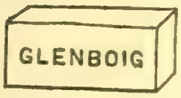

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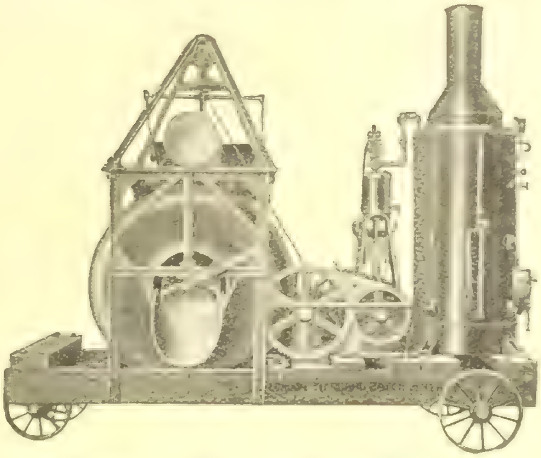

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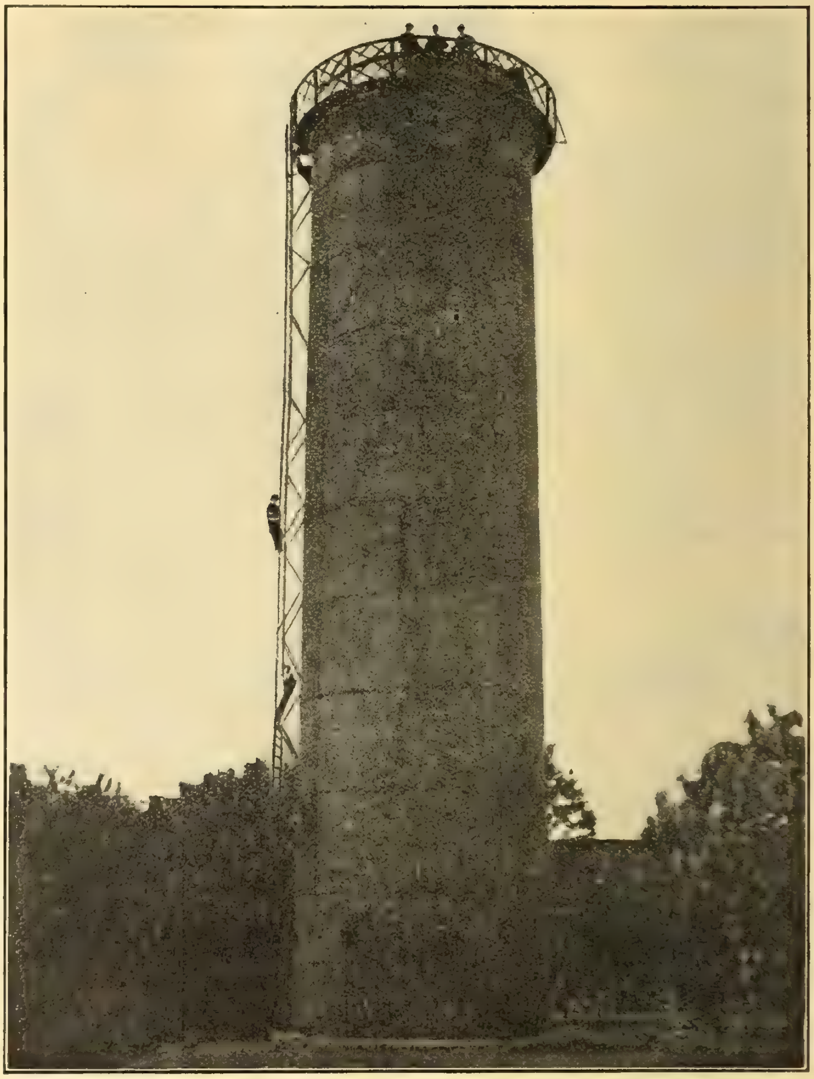

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ENGINEERS AND BOILERMAKERS Limited

14 Strachan Avenue - TORONTO, CANADA

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brampton, Ont.
The inspector of the Canadian Fire Underwriters' Association recommended that a reservoir be constructed at the lake to hold 507,000 imperial gallons, to be used in case of fire only.

Calgary, Alta.
On the report of City Engineer Child as to the cost of a municipal paving plant (capacity 800 to 1,000 yards a day) a by-law will be submitted for $25,000 to authorize the purhcase.

Chatham, Ont.
Tenders addressed to W. G. Merritt, clerk, will be received until February 6th for supply of sewer pipe, brick, sand, gravel, lumber and hardware for 1911.

Edmonton, Alta.
The items in the expenditure in the engineer's department for the year are as follows: Plank walk and crossing construction, ..16,000; concrete walks, $15,000; boulevards, $30,000; paving, $125,000; street railway, $50,000; sewer, $281,000; watermain construction, $40,000; bridges, $165,000; grading, $4,000; subway, Twenty-fourth street, $12,000; west end park and nursery, $6,000; tools and equipment, $2,500; Second street improvement, $20,000; Fourth street improvement (unprovided for, cost approximately $20,000); Fifth street improvement, $7,500; field engineering estimates, $1,000; yard and stable, $35,000; installation of generator, plumbing, $50,000; sliding bank, further investigation to be made regarding cost.

Hamilton, Ont.
Tenders for supply of concrete pipe for sewers in west end will be called.

London, Ont.
Engineer Van Cleve recommends a storm sewer system for the city. The board of works will take this matter up shortly, and from present indications a by-law will be prepared for submission to the electors in January next.

Montreal, Que.
Mr. James Baillie, Board of Trade Building, Montreal, expects to have the plans ready next week for the Villa Maria sub-division. They are now in the hands of a firm of landscape architects in Boston, and as soon as they arrive contracts will be asked for for the construction of sewers and sidewalks, and the grading and making of roads through the property. All this work will be done before the lots are put on the market, and the estimated cost will be in the neighborhood of $500,000. It is understood that the whole will be left as one inclusive contract.

Neson, B.C.
City Engineer G. C. Mackay recommended sewer construction in the south of the city at once at a cost of $4,703, and also the purchase of sewer pipe and fittings to the value of $500.

New Westminster, B.C.
Plans for sewerage systems in the west and east end of the city will be prepared by the city engineer. It is improbable that the work will be carried out this year.

Ottawa, Ont.
A by-law may be submitted to the people shortly to authorize the expenditure of $195,000 for waterworks purposes. For the completion of the work on the aqueduct $150,000 is needed and over $40,000 is required for water main extension on the Glebe.

Regina, Sask.
L. A. Thornton, City Engineer, writes that Regina is making a survey of the spring area with a view to getting definite information as to the supply available. Some repairs are being made to the supply main.

Sarnia, Ont.
Tenders are called until February 4th for supplies for waterworks such as brass service and stop cocks, lead flange couplings. A. A. Kelly, Chairman Fire and Water Committee.

Smith's Falls, Ont.
Tenders will be received until February 6th for $41,501 30-year and 20-year waterworks and local improvement debentures. J. A. Lewis, town clerk.

St. Lambert, Que.
A by-law will be submitted to the ratepayers to issue $225,000, local street and sewer improvement debentures.

St. Thomas, Ont.
Tenders addressed to Geo. K. Crocker, Chairman Board of Water Commissioners, will be received until February 13th for the building of a covered reservoir here. For further information see advertisement in "Tenders and For Sale Department" of this issue.

Vancouver, B.C.
Because of the annexation of Hastings Townsite and D. L. 301, it is thought that an additional amount of $100,000 will be required to provide this new section with a complete water system. A waterworks by-law for $400,000 was approved in the beginning of the year before this district was annexed.

Victoria, B.C.
On the recommendation of the water commissioner, the city will purchase 473 Trident water meters of various sizes at a cost of $7,500; 15,000 feet of 12 in., 10,000 feet of 8 in., 35,000 feet of 6 in., 80,000 feet of 4 in. Mannessman's steel tubes at a cost of $80,000; and 460 gate [illegible] estimated cost of $4,000; and 15 tons of pig lead. These supplies will be used in extensions of the distribution system.

The board of works, at its initial meeting [illegible] pavement to be utilized in the big street improvement scheme, the cost of which will aggregate close to $1,000,000, and instructed the city engineer to take such steps as will enable tenders to be called for almost immediately. The scheme is as follows: Trunk road, $487,125; passed and reported, $321,910; passed, not reported, $399,560; recommended, $304,790.

Railroads, Bridges and Wharves

Amherstburg, Ont.
Plans are being prepared for the construction of a drydock here and possibly a shipyard. Preliminary estimates place the cost at about $250,000. A. H. Clarke, Member for South Essex, is interested.

Barrie, Ont.
Tenders addressed to R. H. Jupp, Superintendent County Roads, will be received until February 10th for pile timber and driving same for substructure, abutments and wing walls of Old Fort Bridge across Wye River. Plans, etc., at office of above or at office of County Clerk, Barrie.

Dartmouth ,N.S.
The Board of Trade and citizens will ask for a Government wharf to be built here capable of accommodating ocean-going steamers. Mayor Notting, Councillor Douglass and A. C. Pyke are interested.

Digby, N.S.
The C. P. R. propose to build a new bridge here on the location made by the old Western Counties Railway.

London, Ont.
A deputation from Caradoc and Delaware Townships, composed of Messrs. D. C. Brodie, John Stewart and Ephraim Howlett, requested the construction of a bridge at what is known as the Giles site, the matter was referred to the board of road directors to report.

Ottawa, Ont.
The Carleton County Council will build three concrete arch bridges during this summer for which tenders will be called. Chas. MacNab, county clerk.

A new and modern swing bridge will be installed by the G. T. R. at the end of Elgin street to replace the railway structure which at present stands there. Mr. [illegible]

Quebec ,Que.
Surveys are stated to have been completed and work will shortly commence on the 170 miles extension from Matane to Gaspe Basin for the Canada & Gulf Terminal.

The tenders recommended for acceptance in the report of Mr. L. A. Vallee, re bridge over St Charles River, were as follows: J. H. Gignac, Ltd., $160,000; Phoenix Bridge Company, $160,500. Both plans called for the swing bridge type The Road Committee decided to hold [illegible] engineer prepare plans for the bascule new bridge for which tenders will be called.

St. Leonards, N.B.
An act has been introduced in the Maine Legislature, granting a charter to Messrs. Wm. H. Cunliffe, Frank W. Mallett, etc., to build a bridge across the St. John river between Van Buren, Me., and this place.

Township of Barton.
On February 14th a by-law will be voted on to issue $6,500, 4½ per cent. bridge debentures. A. G. E. Bryant, Township Clerk.

Vancouver, B.C.
The G. T. P. engineers have been making tests for the purpose of locating a solid foundation for piers, etc. When plans are accepted the construction work will commence immediately. The Albion Iron Works, occupying site, have received notice to vacate.

Welland, Ont.
A special committee from the city council and a similar number selected from property owners will meet shortly for the purpose of reporting on the best plans re site, division of cost, etc., in connection with the high level bridge over Welland canal.

Winnipeg, Man.
It is understood that James J. Hill intends to proceed with immediate railway extension into Manitoba. It is believed that he will not only build the line at present projected, but that he will tap the boundary at a number of points in Western Canada.

As a result of a deputation which waited upon the Board of Control in regard to the proposed bridge across the Red River, which the residents of St. Vital are in favor of, plans and estimates giving full particulars for the consideration of the works committee of city council will be prepared. Mr. Mager, Reeve of St. Vital, and Councillor Wilson are interested.

AWARDED

Burk's Head, N.S.
The contract for breakwater has been let to Messrs. A. W. Girroir & Kinsman Sweet, of Antigonish, N.S., $35,490.

Chapel Cove, N.S.
The contract for the construction of a breakwater has been awarded to Mr. W. J. Landry, of Antigonish, N.S., $11,148.

Duncan's Cove, N.S.
The contract for breakwater has been awarded to Messrs. A. W. Girroir & Kinsman Sweet, of Antigonish, N.S., $6,960.

Morris, Man.
Robert Coats, this place, has been given the contract for the construction of two pile bridges here at $3.13 per foot. Other prices ranged from $3.70 to $5.50.

South Ingonish, N.S.
The contract for wharf goes to Messrs. Robert & Barth Musgrove, North Sydney, N.S., $5,100.

St. Joseph de Letellier, Que.
The contract for wharf goes to Nap. Warren, of Chicoutimi, Que., at $18,900.

Three Fathom Harbor, N.S.
The contract for beach protection goes to Obed A. Ham, of Mahone Bay, N.S. at $7,[illegible].

Public Buildings, Churches Schools, etc.

Arelee, Sask.
Tenders were received until February 1st, 1911, for the purchase of materials and the construction of a school house. Fred Strate, secretary-treasurer.

Berlin, Ont.
Reeve Euler and Aldermen Clement and Kranz have been appointed to confer with the Board of Health regarding the erection of Isolation Hospital.

The Board of Health has requested Mr. Beilstein to prepare sketches of three buildings instead of one to be used as Isolation Hospital. Secretary, Miller.

Calgary, Alta.
Tenders were called until January 31st for the purchase and removal of the old city hall buildings. W. D. Spence, city clerk.

The plans for the new St. Andrew's Church were approved at a recent congregational meeting. Pastor, Rev. Mr. Mahaffy.

The congregation of Knox Presbyterian Church decided to purchase property at Fourth street and Sixth avenue and to erect a church not to cost more than $125,000. Thorburn Allan, treasurer.

The supplementary report of the city commissioners recommended the erection of new fire headquarters and equipment. Estimated cost of building, $38,000. Total cost, $75,000. A by-law will be prepared at once.

Carleton Place, Ont.
J. Albert Ewart, Ottawa, is the architect in charge of the erection of the Zion Presbyterian Church here. Size, ground floor, 90 x 72; number of floors, 2; estimated cost of building, $20,000; cost of equipment, $5,000. We are informed that contracts will be awarded next month. W. Allen, secretary building committee. Noted in last issue.

Chilliwack, B.C.
We are informed that the tenders for hospital building here were considered too high. None were awarded. R. J. Douglas, secretary hospital board.

Edmonton, Alta.
Geo. E. Turner, architect and building commissioner, is in charge of the erection of 3-story primary school between McCauley and Heiminck streets. The school will be built of brick, stone dressings, fireproof floors over boiler room, fireproof staircase wings at an estimated cost of $100,000, which includes everything but desks and furniture. Under date of last information contracts were not stated to have been awarded.

Fredericton, N.B.
Arrangements are being made to secure figures on the erection of a suitable building for the Exhibition in 1912.

Galt, Ont.
At a meeting of citizens interested in the formation of a Business Men's Club here, it was decided that the first step would be the erection of an up-to-date building. Estimated cost, $20,000.

Guelph, Ont.
Plans prepared by Architect Cowan for the erection of Children's Shelter have been accepted by the executive committee. Estimated cost, $10,000.

Kamloops, B.C.
The plans prepared for the new hospital provide for a modern and substantial structure. The building designed has a frontage of 200 feet, and is 144 feet in depth. Estimated cost, $120,000. Noted in issue of January 4th.

Marysville, N.B.
The Methodist Church here was destroyed by fire on the 29th inst. Estimated loss, $65,000.

Montreal, Que.
The Homoeopathic Hospital have a committee at work for the purpose of raising $100,000 for erection of a new building. Dr. J. T. Novinger, secretary.

Orillia, Ont.
Competitive preliminary sketches for proposed new Sunday school for Presbyterian Church are called until February 15th. For further information see advertisement in "Tenders and For Sale Department" of this issue.

Ottawa, Ont.
The Central Canada Exhibition Association have decided to postpone the request for the erection of new machinery hall till next year. Secretary, Mr. McMahon. Noted in last issue.

Peterborough, Ont.
The congregation of Murray Street Baptist Church have decided to build their new church. Estimated expenditure, $56,500. Chairman Building Committee, Mr. T. F. Matthews.

Regina, Sask.
Work on the first building of the Regina Methodist College will be started in the spring. Dr. W. W. Andrews, president.

Souris, Man.
The school board is preparing to build another school in the spring. It will probably be an eight-room building.

A committee from the hospital board, composed of T. H. Patrick, George Brown, and W. McCulloch, have been to Brandon to consult an architect with regard to a new hopsital building.

Strathcona, Alta.
The council granted the request of the Public Library Board for increase of grant and building site. Noted in last issue.

South Vancouver, B.C.
A site in the vicinity of Horne road east of Fraser avenue is being considered for a new school.

Sydney, N.S.
The city council has approved of the granting of $75,000 for the erection of two brick schools.

St. Boniface, Man.
The Roman Catholic Church have decided to erect a fine building on Aulunea street in this city, as a training school for young priests. Plans are being prepared by a Montreal architect. Estimated cost, $250,000.

St. Catharines, Ont.
Architect Thomas Wiley, St. Catharines, is preparing plans for an addition to be built to the Rittenhouse school at Jordan Harbor in the spring. Plans call for an extension of two wings of brick.

St. John, N.B.
The Main Street Baptist Church will start a fund for the purpose of erecting a new Sunday school. W. H. White,

treasurer; W. Heathfield, financial secretary.

M. Sullivan, contractor, Kingston, Ont., is calling for bids for purchase and removal of houses on the site of the proposed new drill hall.

Toronto, Ont.

Hon. W. J. Hanna, Provincial Secretary, received a deputation from the Victoria and Alexandra Industrial Schools requesting the Government grant of $20,000 to the two institutions. It was pointed out that a new school building costing $15,000, is needed at East Toronto. At Mimico the institution requires a new cottage, to cost $25,000, as well as a barn and lavatories, $10,000.

Toronto, Ont.

The Public School Inspectors have asked for the additional accommodation of 92 rooms to be ready for use in September, 1912.

At the annual meeting of the Canadian National Exhibition Association, President Gooderham announced that a Women's Building would be erected this year.

Tenders are called until February 13th by Public Works Department, Ottawa, for alterations to Examining Warehouse here. Plans, etc., obtained at the office of Mr. Thos. Hastings, Clerk of Works, Postal Station F, Yonge street, Toronto, and at the Department.

Tenders, bulk or separate, addressed to G. R. Geary, Chairman, Board of Control, will be received until February 13th for the following trades in connection with the erection of Howland Avenue Fire Hall; concrete, paving, etc., hardware, sliding poles, covers for sliding pole openings, metal weatherstrips, light fixtures, stable fittings. Plans with City Architect. Advertisement in "Tenders and For Sale Department, this issue.

Vancouver, B.C.

The plans for the new church were passed by the congregation of Chalmers Presbyterian Church. Rev. E. A. Henry, pastor.

Competitive plans are invited until February 6th for erection of stock judging pavilion on Exhibition grounds. H. S. Rolston, Secretary, Vancouver Exhibition Association, 319 Pender street.

O. W. Moberg, architect, has submitted plans to the Parks Board for the improvements to Stanley Park, including concert and refreshment pavilions. $15,000 will be spent. Noted in December 21st issue.

The First Presbyterian Church at their annual meeting discussed building plans for their new church. It was decided to call for further plans before making any decision. Noted in issue of December 21. Dr. Fraser, pastor; Messrs. S. Munson, K. J. Marshall, and Ramage, members board of management.

Victoria, B.C.

The site for the new high school has been purchased.

S. J. Drake was appointed chairman of the management committee which has charge of the financing of the building fund for Knox Church.

D. E. Campbell, President of the Hospital Board, urged the necessity of the complete rebuilding of the Jubilee Hospital on a large scale. Referred to a committee.

At the annual meeting of the First Presbyterian Church it was decided to take steps toward the erection of a new church building. Messrs. E. J. Martin, McIlvride and Dempster were elected to the board of finance. Rev. Dr. Campbell, pastor.

Tenders for the erection of the comfort station were received from the following: For the plumbing, heating and ventilating, D. R. Menzies & Co., $6,725; W. Bownass, $5,000; Victoria Plumbing Company, $6,904; Colbert Plumbing Company, $6,897; R. J. Knott, $6,832; J. H. Warner & Son, $7,000; Hayward & Dodds, $6,601; A. Sherret, $6,865.

Tenders for the erection of the building were received from the following: Dinsdale & Malcolm, $13,787; Parfitt Bros., $16,493; Luney Bros., $14,936; Thomas & Hodgson, $13,280; Ferris & Barff, $12,718; city engineer, $12,893.

Welland, Ont.

The town council are considering the purchase of a site for market accommodation and Carnegie Library.

Winnipeg, Man.

Tenders will shortly be called for the proposed addition of 12 rooms to Strathcona school on McGregor street. J. B. Mitchell, Commissioner of School Board.

The Women's Hospital Aid Society contemplate the erection of a convalescent home to cost about $30,000. A grant of five acres is expected from the Provincial Government. President, Mrs. E. M. Wood.

Woodstock, N.B.

Under date of last information the contracts for the brick and stone school house (120 x 80), three storeys, had not been awarded. H. B. Connell and Col. Dibblee, trustees, Woodstock; G. Ernest Fairweather, architect, St. John.

AWARDED

Calgary, Alta.

Grant Brothers were awarded the contract for the erection of the school at Mission Bridge, at $57,000. Marr's Plumbing Company secured the contract for plumbing and heating this school at $12,934. Total, $79,934.

The contract for the erection of the five-roomed addition to the high school was awarded to James McPhail at $32,850. The plumbing and heating in the addition was awarded to Grant Bros., at $11,616. Total, $44,466.

Although tenders were sent in for the building of Hillhurst and the Colonel Walker estate schools, the board decided to make the latter a 12-roomed school instead of an eight-roomed school as previously planned. The former school is to be in a locality where it is much more difficult to haul material, therefore the tenders will have to be increased. Those sending in tenders will be allowed to figure again to guard themselves against loss.

It is estimated that each of these schools will cost $110,000. The plumbing contracts for each were awarded as follows: E. J. Young, for plumbing and heating in the 12-roomed school in Hillhurst, at $17,745 ,and W. Head for plumbing, heating and ventilating in 12-room school near Colonel Walker's estate.

Forest, Ont.

The contract for supply of two No. 24 Kelsey generators and [illegible], manufactured by Jas. Smart Co., Brockville, for high school here was given to Scott Bros., this place.

Grand Falls, N.B.

Contract for public building here awarded to Powers & Brewer, Grand Falls, $17,777.

Montreal, Que.

The contracts for the plumbing, heating and lighting of the new Art Gallery are the chief ones which have not yet been let. Messrs. G. A. Fuller & Co., general contractors, have let the following: Reinforced concrete to Messrs. F. J. Jago & Co., Montreal; excavation, to Messrs John Quinlan & Co., Montreal; marble and granite to The Norcross Bros., Worcester, Mass.

Nanaimo, B.C.

The contract for erection of public building here was awarded to A. Henderson, $23,441.

St. Henri, Que.

Contract for additions to post office awarded to J. Jacob & Co., Montreal, $4,890.

Wolfville, N.S.

The contract for erection of Baptist Church here has been awarded to A. W. Allen, Middleton, N.S., $35,000. C. B. Chappell, architect, Charlottetown.

Victoria, B.C.

The contract for the erection of the public convenience, corner of the Causeway and Wharf street, was awarded to Ferris & Barr, $11,066.90. The contract for the plumbing, heating and ventilating plant will go to W. Bownass for $5,000.

Residences

Brockville, Ont.

Tenders addressed to B. Dillon, architect, will be received until February 4th for erection of addition and alterations to the residence of H. A. Stewart, K.C. Plans, ets., at office of above.

Calgary, Alta.

Tenders addressed to A. Pirie, architect, will be received until February 18th for complete construction, including all material, for an apartment block here for O. G. Devenish.

Ottawa, Ont.

The building permits issued recently include: Edward Wentzlaff, dwelling, MacKay street, $2,500; William Beatty, dwelling, Spadina avenue, $2,500; Jacob Potowin, dwelling, Bell street, $3,000.

Port Colborne, Ont.

S. Port, architect, has plans for J. Tuck's new residence; also for extensive alterations to Price farm house, Welland, for J. C. Laughlin.

Business Buildings and Industrial Plants

Alliston, Ont.

Parker Bros. have decided to build a new grist mill, of brick and concrete, to replace the one destroyed by fire recently.

Brantford, Ont.

The preliminary plans for new Bank of Montreal have been prepared and revised. It is likely that the work will be carried on this year. Noted in last issue.

Berlin, Ont.

It is reported that the Merchants Bank is negotiating for the purchase of he [illegible] on the northeast corner of King and Queen street. Local manager, W. E. Butler. Building operations

(Continued from page [illegible])

Tenders and For Sale Department

ROCK CRUSHERS

We have a No. [illegible] and a No. 5 McCully gyratory type with manganese steel head and concaves, suitable for breaking very hard material. Both are new; never set up. Located New York State. Also a 60-ft. elevator and a 48-in. x 12 ft. McCully screen. Will sell separately. Attractively priced. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

Tenders for
Supply of Asphalt

Sealed tenders, addressed to the Chairman, Board of Control, Winnipeg, Canada, for the supply of from 1,000 to 1,500 tons of Asphalt for street paving for the City of Winnipeg, will be received at the office of the undersigned up to 11 a.m. on **Wednesday, March 1st, 1911.** Specification and form of tender, together with conditions governing tenders, as prescribed by by-law, may be obtained at the office of the City Engineer, 23 James Avenue, Winnipeg, Canada. The Board reserves the right to reject any or all tenders or to accept any bid which appears advantageous to the city.

M. PETERSON, Secretary.
Board of Control Office,
Winnipeg, Jan. 19th, 1911. 4-5

Notice To Contractors
Civic Supplies

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, Ottawa, will be received by the Secretary of the Board of Control, City Hall, Ottawa, up to 4 p.m., **Tuesday, February 14th, 1911,** endorsed "Tender for Broken Stone, Brick, Stone Curbing, Stone Setts, Cement, Plank and Cedar, Sand, Vitrified Clap Pipe, Asphalt, Castings, or Hardware," as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.
Ottawa, Jan. 21st, 1911. 4-5

Cast Iron Water Pipe

Sealed tenders addressed to the City Clerk, Brandon, Man., endorsed "Tender for Cast Iron Pipe," will be received until 12 o'clock noon on Friday, the third day of February next, for from Ten to Twenty Thousand Feet of Six Inch and Four Inch Pipe.

The 6" pipe to be 30 lbs. per foot and 4" pipe 20 lbs. per foot, which must be tested to hydrostatic pressure of 300 lbs.

5,000 feet to be delivered by April the 15th, and the balance not later than the 21st day of June next.

Specifications may be had from the City Engineer's office, Brandon.

The lowest or any tender not necessarily accepted.

ALD. CATER, R. E. SPEAKMAN,
Chairman Waterworks Com. City Engineer.
Brandon, Man., Jan. 18, 1911. 4-5

TENDERS

Sealed tenders, addressed to the undersigned, will be received until noon on Monday, February 13th, for the building of a clear water covered reservoir at the St. Thomas Waterworks. Plans and specifications may be seen at the City Engineer's office, St. Thomas, and blank forms of tender obtained. Tenders must be accompanied by a certified cheque payable to the Treasurer of the City of St. Thomas, for five per cent. of the amount of tender. This cheque will be held until the successful tenderer enters into contract for the due completion of the work.

GEO. K. CROCKER,
Chairman Board Water Commissioners.
St. Thomas, Jan. 23, 1911, 5-5

Notice To Contractors
Water Works Supplies

Sealed tenders, addressed to the Chairman of the Waterworks Committee, City Hall, Ottawa, will be received by registered post only, up to 4 p.m., **Tuesday, February 14th, 1911,** for the supply and delivery of Brasswork, Special Pipe Castings, Hydrants, Cast Iron Pipe, Lead Pipe and Pig Lead, Valves or Oils and Grease as the case may be.

Specifications, form of tender and full particulars may be obtained on application at the City Engineer's Office, City Hall, Ottawa.

Any tender received after the above stated time will be declared informal.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.
Ottawa, Jan. 21st, 1911. 4-5

TENDERS
Howland Avenue Fire Hall

Bulk tenders or separate tenders for the several works mentioned below, in connection with the above building, will be received by registered post only, addressed to the undersigned, up to noon on

MONDAY, 13th FEBRUARY, 1911.

1. Concrete Paving., etc.
2. Hardware.
3. Sliding Poles.
4. Covers for Sliding Pole Openings.
5. Metal Weatherstrips.
6. Light Fixtures.
7. Stable Fittings.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents.

The usual conditions relating to tendering, as prescribed by city by-law, must be strictly complied with, or tender may not be entertained.

Tenderers shall submit with their tender the names of two personal sureties or the bond of a guarantee company.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.
City Hall, Toronto, 23rd January, 1911. 5-5

TO ARCHITECTS

CASH PRIZES of One Hundred, Seventy-five, and Fifty Dollars are offered for competitive Preliminary Sketches of proposed new Sabbath School building and Church Parlors for Orillia Presbyterian Church, Sketches to be in hands of undersigned not later than February Fifteenth. Full information may be had from J. J. THOMPSON, telephone 261, Orillia.

5-6 T. G. KING, Secretary.

City of Strathcona
(Alberta)

Tenders for
Engine, Boilers and Generators

Tenders addressed to David Ewing, Chief Engineer power house, Strathcona, Alta., for the above machinery, will be received until noon, Wednesday, March 1st, 1911. Specifications may be obtained upon application to the undersigned.

A. J. McLEAN,
City Engineer.
Strathcona, Alta., Jan. 16, 1911. 4-8

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No ten cents extra

ARCHITECT'S GENERAL ASSISTANT, Toronto, 1st week March; desires situation, any capacity; qualifications, P. A. S. I.; typewriter; any capacity start. SCOTT, 151 Vine street, Lockport, U. S. A. 5-5

ARCHITECT, highest qualifications and experience, would take charge of office or consider partnership. The West preferred. Box 200, Contract Record, Toronto, Ont. 4-7

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

AGENTS WANTED—Large United States Terra Cotta company desires high-class agencies for Canada. Send particulars to W. D. Ward, Tribune Building, New York City. 4-6

THE STEEL SQUARE—For sale—4 copies of vol. 1 and 2 copies of vol. 2 Fred T. Hodgson's book, "Practical Treatise on the Steel Square." 242 pages. Price, only 50 cents a copy. Contract Record, 220 King street west, Toronto, Ont. 4-5

REPRESENTATIVES WANTED — Reliable firm manufacturing complete line of electrical measuring instruments want responsible representatives to handle their lines throughout the whole of Canada. Are prepared to deal separately for Eastern and Western Canada. Box 194 Contract Record, Toronto, Ont. 3-5

REPRESENTATIVES WANTED IN CANADA—British firm of electrical and mechanical engineers manufacturing electric lighting specialties, wants to secure reliable Canadian representatives who will carry a stock in Canada. Write for particulars to Box 199, Contract Record, Toronto, Ont. 4-5

CAPITAL WANTED for interior fitting factory doing a first-class business in bank and store fixtures. Splendid equipment and first-class connection. Preference stock for $20,000 to be issued. Apply for particulars to Box 207 Contract Record, Toronto. 5-6

The City of Calgary

Tenders will be received by the City Commissioners up to the 19th day of February, 1911, for 200 (more or less) 5-light ornamental lamp posts to be delivered in carload lots as required. All persons tendering will submit their designs, together with full dimensions, weights, etc.

Globes are to be of light alabaster. Eash post must be equipped with standard Edison sockets, all complete and ready for wiring up. Tenderer will also submit prices on extra globes which might be required. Tungsten lamps will be supplied by the city. A cheque for two per cent. of the bid must accompany all tenders. The city reserves the right to accept the whole or any part of a tender; the lowest or any not necessarily accepted.

Dated at Calgary, January 27th, 1911.

A. G. GRAVES,
City Commissioner.

5-6

Sale by Tenders

In re The

St. John P.Q. Brick Co.

Limited

In Liquidation.

Will be sold, by tender, the St. Johns P. Q. Brick Plant, situated in the town of St. Johns, P.Q., and being as follows:

Land.—15 acres, more or less, situated between the G. T. R. and the C. P. R. lines, with sidings of both companies in the brick yard. Clay of the best quality.

Buildings.—Office, wood building, 24 x 26 feet. Kiln shed, wood, 58 x 223 feet. Engine building, brick, containing engine, boiler and motor, 23 x 32 feet and attached to this building one small shed for fuel 12 x 23 feet. Building for brick presses, wood, 58 x 125 feet. Another small building 10 x 52 feet. Building with horse stables 34 x 47 feet. Sand house, 12 x 24 feet. Dryers of a capacity of 350,000 to 400,000 bricks.

Machinery and Accessories.—All the machinery and accessories necessary to the brick manufacturing: two brick presses, one clay press of a capacity of 40,000 bricks per day and one cement press of a capacity of 20,000 to 25,000 bricks per day, trucks, wheelbarrows, horse trucks, railway trucks, pallets, etc., etc., and office supplies, safe, typewriter, desks, etc., etc. Plant ready to be operated.

The whole to be sold as it now is and without warranty whatever as to precise measurement, quantity or otherwise.

The tenders shall be sent to the undersigned, by registered letter, on or before February 13th, 1911. Each tender to be accompanied with accepted cheque of 10 per cent. of its amount, the balance payable on acceptance of tender, or special terms of payments if approved by the Superior Court of the district of Iberville. The highest or any tender will not be necessarily accepted.

Further information may be had from the undersigned or his attorneys Messrs. Henecker, Duff and Johnson, advocates, Montreal.

St. Johns, P.Q., January 13th, 1911.

WM. McNULTY,
Liquidator.

5-5

Positions Vacant

Advertisements under this heading [illegible] cents a word per insertion

Superintendent wanted for interior fitting factory, manufacturing a high class of fittings, must be able to invest [illegible] dollars. Only practical man and a pusher considered. To such good returns guaranteed. Apply with particulars to Box 208, Contract Record, Toronto.

5-6

DREDGES FOR SALE

A one yard Beatty dredge in first-class shape, within a few miles of railroad station, suitable for dredging or ditching; also a half yard machine with portable oak hull in first-class shape. Apply FRED. A. ROBERTSON, Cornwall, Ont.

4-6

Business Buildings and Industrial Plants

(Continued from page 33)

will commence on expiration of lease, in 1912.

Calgary, Alta.

The Dominion Bank received permission to commence tearing down the Bradley & Tuck building on the corner of First street east and Eighth avenue preparatory to the erection of their large block.

Tenders are called until February 16th for the erection of a brick and stone building for Messrs. Beveridge Bros., on corner of Seventh avenue and First street east. Plans, etc., with Hodgson, Bates & Butler, architects, Grain Exchange.

At a special meeting the city council reached an agreement with the C. P. R. whereby the latter will at once proceed with the erection of a hotel in this city, which when completed will cost in the neighborhood of $1,000,000.

Cornwall, Ont.

The counties of Stormont, Dundas and Glengarry have appointed a special committee to procure plans and ask tenders for the erection of a joint House of Refuge on the site given here. Coonties Clerk, A. I. Macdonnell.

Edmonton, Alta.

A modern three-storey warehouse block, 140 by 50 feet, will be ercted on the corner of Peace avenue and Seventh street, by Nicholson and Bayne, commission merchants and brokers.

Tenders addressed to H. A. Magoon, architect, Credit Foncier Building, will be received until February 10th for the erection of a brick and stone 90-roomed hotel on Jasper avenue.

Plans are being prepared, it is understood, by representatives of the Houston estate, of which Rev. Dr. McQueen and Wm. Short, K.C., are excutors, for the erection of a large business block on Jasper avenue. Estimated cost, $75,000.

Guelph, Ont.

Alterations costing about $17,000 will be made to the Bank of Montreal office here. Contracts have been awarded. Work will start in April.

It is understood that plans are under consideration by Mr. Mahoney, architect, for the new arcade which certain parties have under contemplation to run through from St. George's square to Cork street, with offices above.

Gowganda, Ont.

The following buildings were destroyed by fire in the recent fire: Queen's Hotel, Canadian Bank of Commerce, Taylor drug store, etc.

Hamilton, Ont.

Canadian Northern Railway Company are reported to be buying property in the neighborhood of Macnab and Stuart streets. That is taken to indicate the company's intention of building a station near the corner of James and Stuart streets.

Hull, Que.

Mr. Ernest Smith, of Ottawa, representing an American firm, has under consderation the location and erection of a factory to cost about $100,000.

Lignite, Alta.

Thomas McKelvie, of Lacombe, is erecting a $20,000 hotel.

Medicine Hat, Alta.

W. P. Hull, Calgary, writes that no plans have been prpared as yet for business block here. Noted in issue of January 18th.

D. Milne, Mayor, writes re erection of large refining plant here that the agreement with city provides that buildings, elevators, etc., will be complete and plant in operation by October. Materials, fireproof, brick and cement. Capacity, 1,000 gallons per day; estimated cost of building and equipment, $50,000. The company is yet to be incorporated. Noted previously.

Moose Jaw, Sask.

W. A. Kirkwood, secretary, Board of Trade, is in receipt of an enquiry from a [illegible] manufacturing [illegible] as to the location of a warehouse here.

Middleton, N. S.

The following lost in the recent fire here: Royal Bank, Parsons, Elliott & Co., Marsdens, Shaffners, and Bentley & Co. Loss, about $120,000.

Montral, Que.

The Montreal Harbor Commission announce the purchase of about 70,000 sq. ft. of land east of the Dominion Cotton Mills which will be used as a harbor yard for repair shops.

Mr. L. W. Just, secretary Ritz-Carlton Hotel Company, 80 Notre Dame west, is arranging for a contract for the tearing down of the buildings now on the site of the new hotel.

Nelson, B.C.

The Hudson Bay Company's store here will be remodelled. E. P. Gigot, manager.

Ottawa, Ont.

The northwest corner of Mosgrove and Rideau streets has been purchased by C. A. Douglas, F. T. Graves and R. McMorran. A six-storey building is one of the propositions reported.

Pembroke, Ont.

The Canadian Box & Barrel Company are considering expansion which will be followed by the building of a factory to construct collapsible boxes and barrels, etc. Mr. Geo. [illegible] is interested.

Picton, Ont.

Messrs. Church Bros. will build a new canning factory here. Cost, about $50,000, corner of Talbot and Main streets.

Port Arthur, Ont.

The contract calls for the removal of the houses on the site for the armory by April 1st. Contractor McRae.

Quebec, Que.

The Hochelaga Bank, it is stated, has purchased the property at the corner of Crown and Desfosses streets.

Regina, Sask.

Under date of last information re the 6-storey steel and concrete faced stone and brick office building, corner 11th avenue and Lorne street, the contract had not been awarded. M. W. Sharon, architect. Noted in January 18th issue.

Cameron & Heap, wholesale grocers, will erect a large warehouse on Rose street, $45,000. Haug Brothers & Nellermoe Company of Winnipeg have undertaken to erect an implement warehouse which will cost at least $50,000. The Toronto Type Foundry Company, of Toronto, will also erect a warehouse in Regina this summer, $20,000. Noted previously.

Souris, P.E.I.
The woodworking steam mills of Barnard Creamer were destroyed by fire, $8,000.

Stewart, B.C.
The Finch-Hickey department store was destroyed by fire on the 27th ulto. Estimated loss, $20,000.

St. Catharines, Ont.
The ratepayers have authorized the by-law giving civic privileges to the Steel & Radiation, Limited, in return for which the company will erect buildings valued at $50,000.

St. John, N.B.
Joseph R. Clarkson, manager for the Partington Pulp & Paper Company, is authority for the statement that the new mill will be erected in the near future. Plans are being prepared in England.

Tenders are called until February 13th for the purchase of the brick plant here. For further information see advertisement in "Tenders and For Sale Department" of this issue.

Summerside, P.E.I.
Mr. M. F. Schurman & Company's mill was destroyed by fire recently. Loss, $7,000.

Sydney, N.S.
The general offices of the Dominion Steel Corporation were destroyed by fire on the 25h ulto. Loss on building, about $50,000. General Manager, M. J. Butler.

Sarnia, Ont.
The Imperial Oil Company's plant here was damaged last week to the extent of about $15,000.

Toronto, Ont.
The Dominion Bank will erect a large bank building on the northeast corner of King and Yonge streets. No definite time is stated for construction. General Manager, C. A. Bogart.

The C. P. R. offices, corner of King and Yonge streets, will have a frontage of 85 feet on King street and 100 on Yonge street, will be 15 storeys, of steel, faced with glazed terra cotta at a cost of about $1,000,000.

Tenders will be received until February 2 for excavation required in erection of 6-storey warehouse, corner King and Parliament streets for the Aluminum and Crown Stopper Co. Architect, F. H. Herbert, 65 Adelaide east.

The Lake of the Woods Milling Company have purchased 100 feet frontage on Dupont street near Kendall avenue, on which a mill will be built. The sale was effected by H. G. Phillips, 206 Dupont street.

Vancouver, B.C.
W. S. Collister & Company announce extensive alterations to their premises.

P. Burns & Co. will build an extension to cost about $200,000 to their abattoir plant.

Plans and specifications for a three-storey block wanted. For full particulars apply Saskatchewan Land Company, 3127 Westminster road.

Plans are now being prepared by the engineers of the B. C. Electric Railway Company for extensive freight terminals on the north shore of False Creek. Frontage was purchased several years ago. A permit will shortly be requested for the first of the new buildings at the point, this being a freight shed 80 by 120 feet in size.

Victoria, B.C.
Mr. P. R. Brown has been given a permit for 3-storey block on Broad street, $40,000. H. S. Griffiths, architect.

Messrs. Finch & Finch have let the contract for the erection of their business building on the site of the Moore & Whittington factory.

Messrs. David Spencer & Co. have had plans prepared for their new departmental store which will cost about $600,000 and will call for eight storeys. The site is as yet undetermined.

Weymouth, N.S.
G. D. Campbell's pulp mill here was destroyed by fire on the 24th ult. Estimated loss, about $50,000.

Winnipeg, Man.
Work on the new 3-storey office building for the Mortgage Company of Canada will be commenced in the early spring. Manager, A. Gouzee.

Woodstock, Ont.
The ratepayers will vote on the by-law granting civic privileges to the Ken-Knit Company on February 20th. Noted in last issue.

AWARDED

Guelph, Ont.
Tenders for most of the work of alterations to Imperial Hotel have been let by Architect Mahoney: Geo. Ibbotson, carpentering; Sam. Rundle, stone and brick work; W. Scriven, plumbing.

The contracts for alterations to Bank of Montreal are as follows: Robt. Dunbar, mason work; Geo. Scroggie, carpenter; Geo. Wolcott, galvanized iron; J. J. Mahoney, plastering; Stevenson & Malcolm, electric wiring and lighting; Wm. Scriven, painting; Fred Smith, heating and plumbing; Hamilton Bridge Works, steel and iron work. Estimated cost, $17,000.

Ottawa, Ont.
W. G. Adamson has the contract for repairing the methylated spirits warehouse, recently wrecked by an explosion.

Peterborough, Ont.
The contract for the building of the new factory of the Lakefield Canoe Building and Mfg. Co., has been let to Messrs. Baptie Bros.

Toronto, Ont.
The Porous Terra Cotta fireproofing contract of the Annette Street School, West Toronto, has been awarded to Robert Bennett, contractor, of Euclid avenue.

Victoria, B.C.
The contract for erection of Mr. P. R. Brown's 3-storey office building was awarded to Messrs. Murray & McKinney. The estimated cost is about $38,000. H. S. Griffiths, architect.

Winnipeg, Man.
M. Peterson, Secretary Board of Control, writes that the contract for steel work for power sub-station No. 1 King has been awarded to The Manitoba Bridge & Iron Works, Limited, Winnipeg, $12,413.

Power Plants, Electricity and Telephones

Calgary, Alta.
A by-law is being prepared for the expenditure of about $300,000 for electric power, which will be spent in transformers and sub-stations and new machinery. In addition to this it will be necessary to provide more underground cabling. Commissioner Graves is interested.

Edmonton, Alta.
Four schemes are submitted in connection with the new 6,000 gallon pump, and the estimates of cost vary from $26,000 to $75,000 for the pumping plant alone.

Apart from machinery, the estimated expenditures of the power house department for the year are $19,830. This sum will cover the cost of a $10,000 addition to the builder house, the installation of a motor generator, $12,000.

Edmonton has appointed a city council committee to deal with the International Heating and Lighting representative with regard to a gas franchise. The International company asks for a twenty-five year franchise to supply gas.

The Edmonton Heat and Power Company, in which is included local and eastern capital, propose to produce several hundred thousand horse power by a hydro-electric plant on the Saskatchewan river, sixty miles up from Edmonton, where they have secured rights to construct a dam and other works necessary.

The expenditure for power house department for financial year may vary from $139,750 to $298,750, according to the plans accepted by the commissioners. For the 2,000 kilowatt alternator alone, which will increase the capacity of the lighting and power plant, and also for the street railway department, the estimates vary from $80,000 to $190,000. Four alternative engines and alternators are estimated upon, giving this wide range of cost.

Iroquois, Ont.
It is reported that M. F. Beach, Iroquois, will develop power on the Madawaska river at High Falls near Calabogie. Engineer McRae, Ottawa, has investigated to some extent.

Prince Albert, Sask.
This city has been granted the La Colle Falls power franchise and the lands that will be flooded by the damming of the river. Noted previously.

Portage la Prairie, Man.
At a meeting of the city council a special committee was appointed to ascertain the possibility of purchasing a central electric light and gas plant with the view of a municipal owned plant to furnish the city with light and power.

Regina, Sask.
Tenders addressed to S. P. Porter, Deputy Minister, will be received until February 9th for supply of insulators, toppins, guy wire, copper sleeves, cross-arms, galvanized iron wire, pole line, hardware, etc. Specifications at Department of Railways and Telephones.

Victoria, B.C.
Angus Smith, city engineer, is authority for the statement that plans and specifications were being drawn preparatory to the calling for tenders for the large amount of street work contemplat- It is hoped that contracts for much of the work will be let within two weeks' time.

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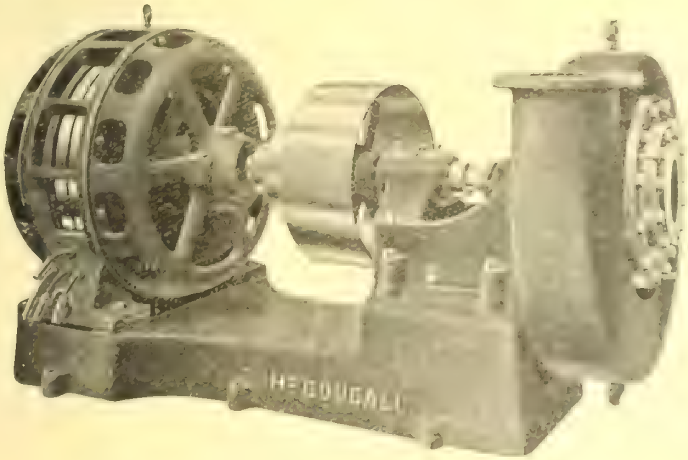

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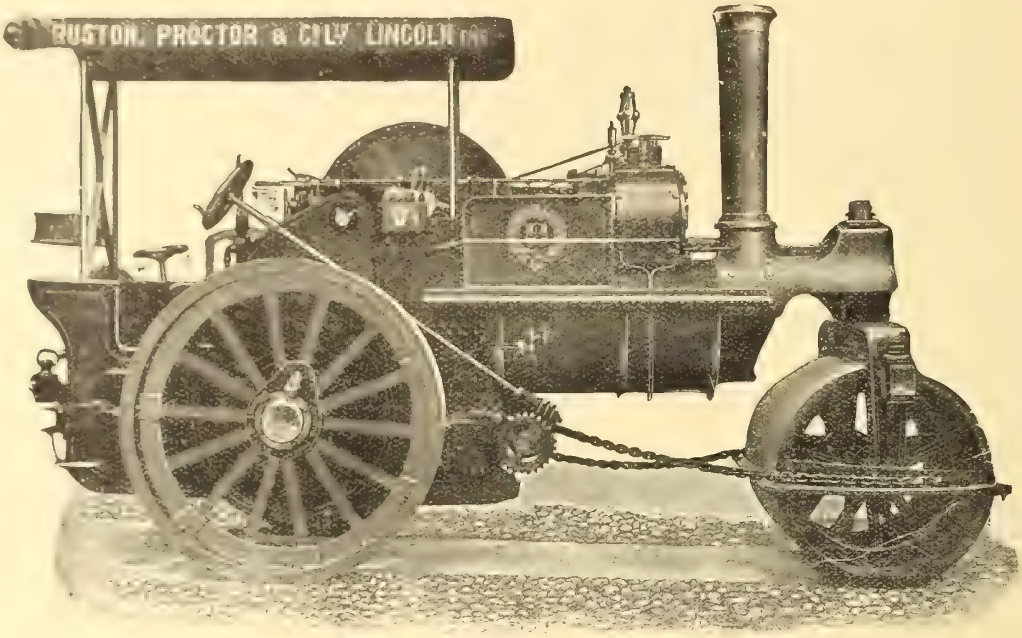

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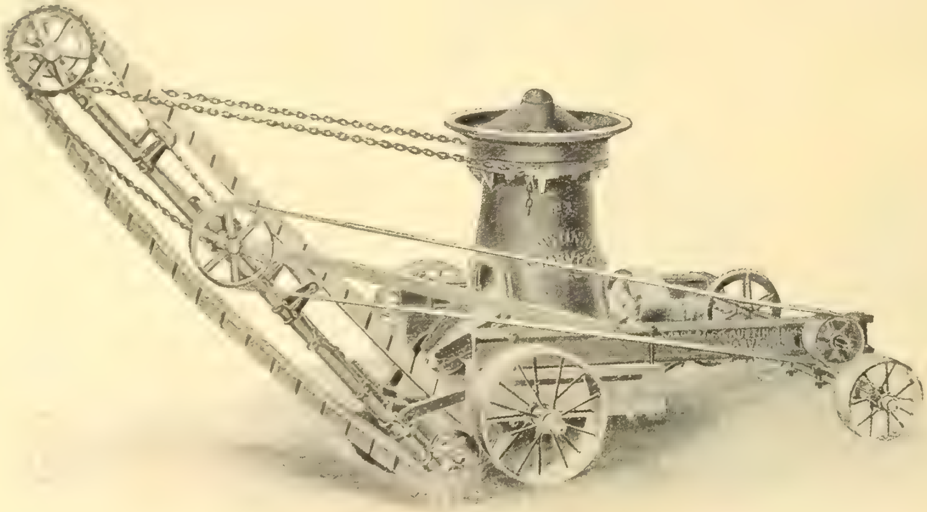

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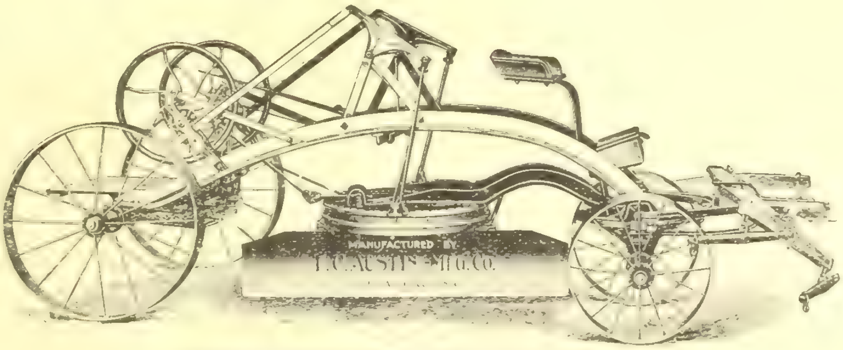
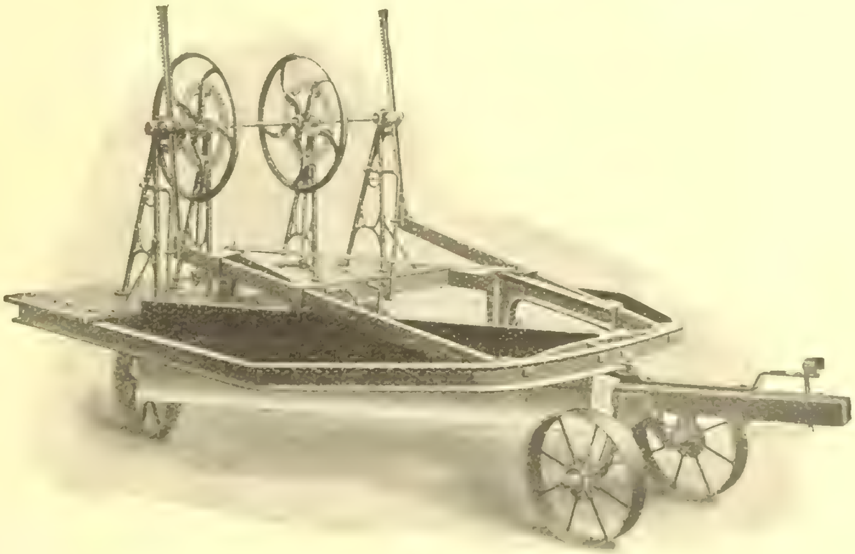


AUSTIN REVERSIBLE ROAD MACHINE



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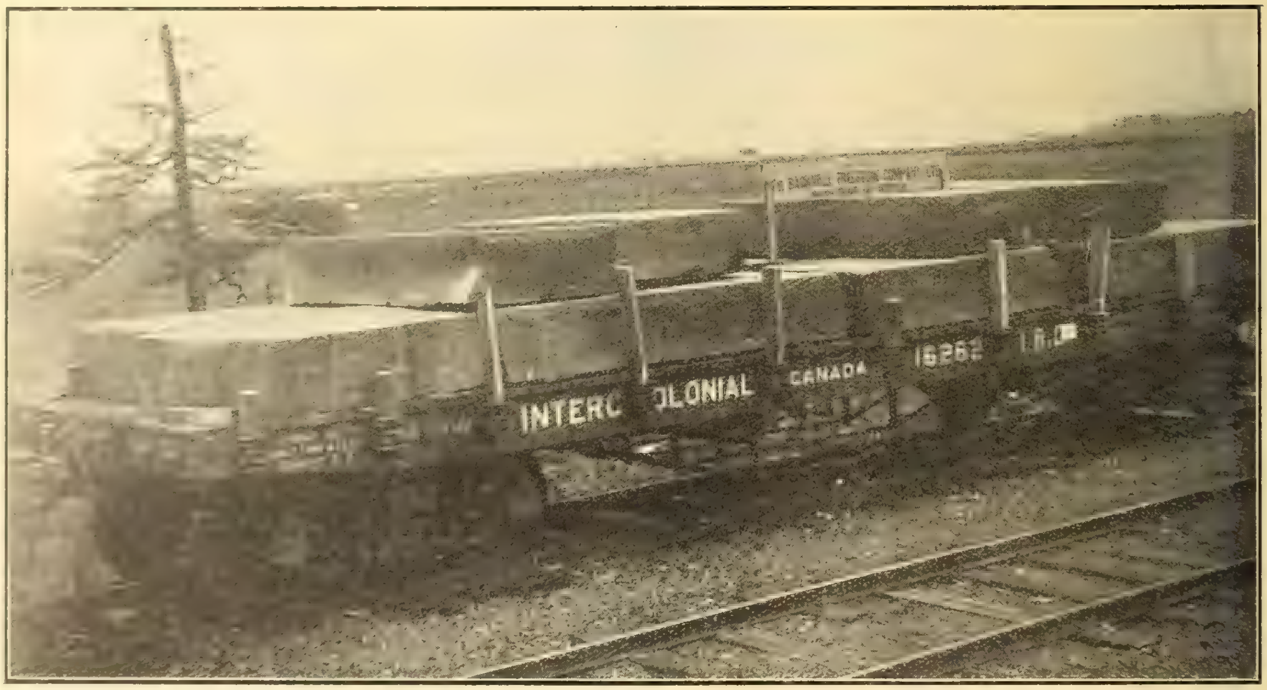

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Vol. 25 February 1, 1911 No. 5

The Canadian Society of Civil Engineers

The annual convention of the Canadian Society of Civil Engineers at Winnipeg last week provided further evidence of the rapid development of this institution, of the excellent work which is being carried on by its various committees and of its indispensableness to the profession at large.

Of the many significant things that one might notice in connection with this meeting, the general recognition of the status of the Society is particularly worthy of mention. The members may well feel an appreciable measure of gratification in that their Society is the only one that has been accorded free transportation by a Canadian railroad. Such a concession on the part of the Canadian Pacific Railway truly is a great tribute to the profession and an acknowledgement of its supreme importance in advancing the best interests of the country. Then there was the magnificent reception by the Winnipeg civic officials, a proof that one of the most progressive cities on the continent considered the occasion worthy of its best effort.

An important work which the Society is only just undertaking consists in the preparation of standard specifications governing the various branches of engineering work. In this connection the Society's reports on cast iron pipe and cement are of the greatest value. Standard specifications for steel structures are now under consideration. It is hoped to bring these before the next annual meeting.

The committees on the various branches of transportation have completed portions of their work. An important contribution next year will be a discussion on the relative value to the country of railways and canals as a means of communication between the Great Lakes and the seaboard. Particular regard will be had in this discussion to the much discussed Georgian Bay ship canal, as regards the expediency of the construction of which some engineers, at least, have entertained serious doubts.

A few facts concerning the policy and inside work of the Society may be of special interest at this juncture. In the first place, the Society aims to develop as a truly national institution and to extend its influence to all parts of the Dominion. The first step in this direction was the establishment of the branches formed in Quebec, Ottawa, Toronto, Winnipeg and Vancouver. In addition to these, branches will be formed at an early date in Halifax and Edmonton, thus establishing a chain around the country and linking up the interests of the profession in a manner that will mean much for its ultimate development. Supplementing this the Society has endeavored to pay adequate attention to important centres outside of its headquarters by holding its annual convention whenever possible at the home of the retiring president. It may be said that in so doing there has been no intention of neglecting Montreal, which will possibly be the seat of the 1912 convention. In pursuance of the same broad idea of development, the council, under the revised by-laws of the Society, must necessarily be representative of the whole country, since three members must reside in the Maritime Provinces, three in the Province of Quebec, three in eastern and three in Western Ontario, three in Manitoba and three west of the last named province. These are in addition to the six councillors residing at headquarters, upon whom devolves much of the Society's routine work.

The chief means which the Society adopts for the advancement of engineering knowledge is the publication of professional papers. Much of the difficulty experienced hitherto in obtaining such papers is expected to be overcome by the more complete co-operation of the branches. It is now arranged that papers may be read at the branches independently or concurrently with headquarters, and that such papers, on the recommendation of the branches, will be published in the Society's transactions. The latter arrangement is regarded as a particularly wise enactment. One of its greatest advantages will be the spirit of rivalry among the branches which it will stimulate, a consideration which is strengthened by the possibility that the medal awarded for the best paper during the year may be presented in this way to a member of one of the branches.

The Canadian Society of Civil Engineers is an institution in which the country should have a national pride. At this stage of our development, engineering occupies perhaps the most important place in the professions and the standing of an engineer in the Society is an indisputable measure of his standing in the community.

Among those who are identified most closely with the work of the Society and who are the most interested in its welfare there would doubtless be a feeling akin to resentment if a special tribute were not paid to Professor McLeod, whose zealous devotion during the twenty-one years that he has been Secretary of the institution has contributed so much to its advancement.

A permit was taken out just before the close of 1910 for what will be the largest office building west of Toronto; to be erected on the southwest corner of Homer and Pender streets. The structure will be 13 stories in height and will contain 308 offices and suites, served by four elevators. In the basement will be located one of the finest cafes on the coast. The building will cost $650,000.

Over 15,000 cubic yards of rock will be required for the foundation of the new steamship pier being constructed by the C. P. R. on Vancouver harbor front.

The Close of a Notable Life

News of the sudden and tragic death of Mr. J. E. Schwitzer, of Montreal, on January 23rd, was learned with keen regret by railroad and engineering circles in many parts of Canada. Mr. Schwitzer's demise came at the moment when he had just reached one of the highest positions in his profession. He had been chosen three weeks previously to fill the post of Chief Engineer to the entire C. P. R. system. He was attacked by la grippe and was removed to the Royal Victoria Hospital within three days of taking up his new duties. Pneumonia set in and he became steadily worse and passed away after a short illness. The body was taken to Ottawa for interment.

The late Mr. Schwitzer was born in Montreal on April 19th, 1870, and graduated from McGill in 1891 with a degree of B.A.Sc.

His first position was with the Temiskamingue Colonization Railway as a roadman and later he became engineer on location and construction for the Ottawa and Gatineau Railway. From January to July, 1892, he was engaged in land surveying and engineering at Ottawa and from then until September, 1896, he was assistant engineer on location and construction, of the Parry Sound Colonization Railway and engineer in charge of the Central Counties Railway between South Indian and Rockland for the Canada Atlantic Railway. Then for three months he was busy surveying for the Hull Electric Railway, after which, until July, 1899, he went into private practice as a civil engineer and land surveyor at Rat Portage, of which town he was appointed engineer in 1898.

The late Mr. J. E. Schwitzer, Chief Engineer of the C. P. R.

Mr. Schwitzer returned to railway work in July, 1899, when he was appointed assistant engineer of the C. P. R. in charge of terminal improvements at Rat Portage and afterwards became assistant engineer of maintenance of way at Winnipeg. His next promotion was to the post of resident engineer of district No. 2 of the C. P. R. at Winnipeg and later he became divisional engineer of the Central division of the same road.

In 1905 Mr. Schwitzer was appointed engineer of western lines of the road at Winnipeg and in 1907 assistant chief engineer of the same district. His appointment to the post he held at his death was announced on January 1st of this year; it was a position which had not been held for some time.

Sir Thomas Shaughnessy thought very highly of the late Mr. Schwitzer, and when told of his death said: "It is impossible to put into words the great loss the company has sustained in the death of Mr. Schwitzer but it is even harder to speak of the loss to his personal friends who have watched his progress. Personally and officially I can say that he cannot be replaced."

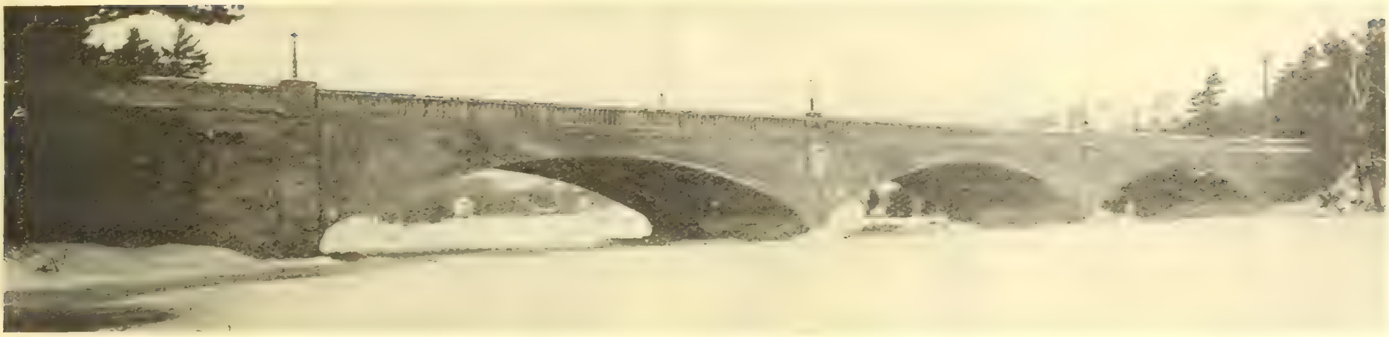
Temporary wooden bridges are being built across the River Po to furnish crossings in the vicinity of the grounds on which will be located the various buildings of the international exhibition which will be held in April to commemorate the fiftieth anniversary of the Kingdom of Italy. The largest bridge, according to "The Engineer," is being built with two levels, the lower one for moving platforms and the upper one for pedestrian traffic. The river at the bridge site is about 650 ft wide and the bridge is slightly less than 1,000 feet long. It has five spans. The roadway is supported by four sets of four piers, each pier consisting of four vertical timbers braced by horizontal pieces. All connections are by iron bolts and plates. The trusses are of the Howe type. The lower roadway is carried just above the lower chord, while the upper roadway is a deck supported above, but not on, the top chord, by posts directly above the verticals of the trusses. On these posts is the usual floorbeam and stringer construction for carrying the decking. The river Po occasionally changes from a quiet stream into a swollen torrent and the bridge construction is necessarily heavy to guard against the possibility of the structure being damaged during a flood period.

The parties behind the scheme to build a scenic railway to the summit of Grouse Mountain, in North Vancouver, B.C., are Messrs. Macdonell & Gzowski, the well-known engineers and railway contractors; Chas. H. Allen, barrister, formerly of Winnipeg, and later of San Francisco; Geo. M. Gibbs, broker, and formerly inspector and later manager at Dawson of the Canadian Bank of Commerce; and Walter E. Graveley & Co. The idea is to build a mountain railway similar to that up Mt. Tamalpas, near San Francisco, and to have an hotel and summer resort on the summit, with cottages for summer residents.

The decision of the C. P. R. Company to transform its coasting fleet gradually into oil burners calls for provision to be made for the storage of oil. A huge tank capable of holding 50,000 barrels will be located on the Inlet foreshore, at the end of Bute street; from this tank pipes will run along the wharves and connect with a smaller tank holding about 20,000 gallons.

The building permits in Victoria for 1910 reached the record total of $2,371,095, as compared with $1,773,420 for 1909, and $1,130,740 for 1908. The expenditure on civic improvements has been large, and the city is being beautified in many ways.

There is a strong probability that the British Empire Bridge Works, of Birmingham, Eng., one of the greatest firms in its line on the globe, will establish an engineering and construction branch near Vancouver, to cost $5,000,000.



Inverlea Bridge, Peterborough, Ont.—Looking North, January 7, 1911.

A Noteworthy Reinforced Concrete Bridge

Detailed Description of the Inverlea Bridge at Peterborough Ont. — Features of Design and Construction Cost and other Data

Contributed by T. A. S. Hay, City Engineer, Peterborough.

This bridge spans the River Otonabee in the line of Smith Street in the city of Peterboro, Ont., and replaces a wooden Howe truss bridge.

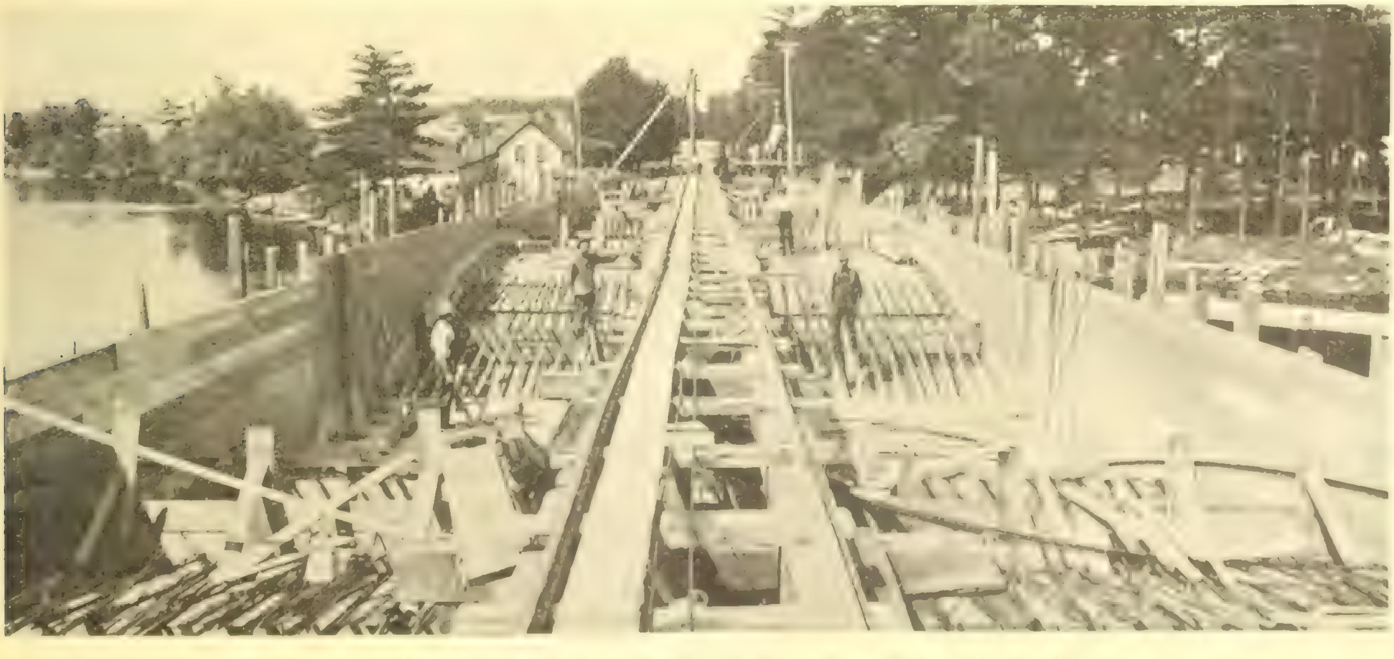
It consists of three arched spans of reinforced concrete, 100 feet centre to centre, or 94 feet clear, with abutments reaching well into the river banks on both sides and beyond the shore lines, making a total length of structure of 385 feet.

The arches were designed to sustain a maximum live load represented by a 15 ton road-roller. The clear width between railings is 31 feet, sidewalk 5 feet wide on south side, a space 10 feet wide for single track street car line on north side, and 16 feet roadway between. The centre line of the bridge makes an angle of 72 degrees with the channel of the river. The intrados of arch is a two centre curve or 3 feet 9 inches, 120 feet radii and a rise of 12 feet. The extrados is a segment of a circle of 170 feet radius. The arches have a radial thickness of 22 inches at crown to 48 inches at the point of lesser radius, 45 feet from crown.

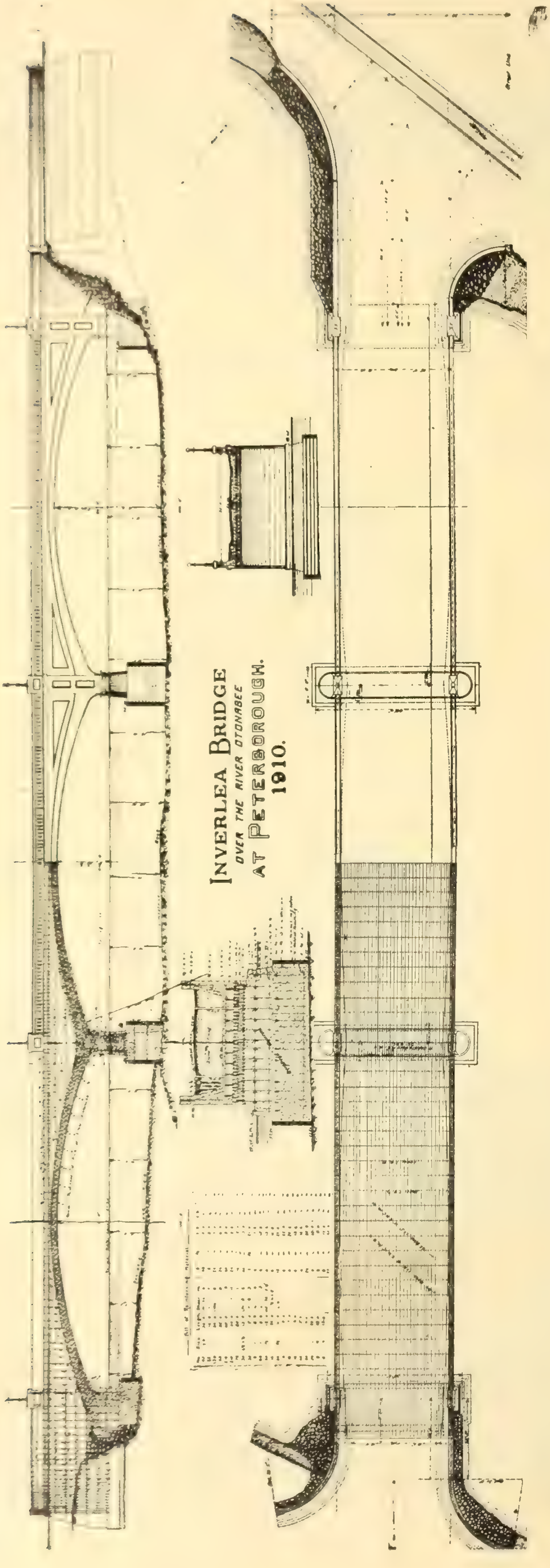
The west abutment rests on a compact mass of boulders and heavy gravel. The two channel piers and east abutment rest on a heavy bed of limestone rock. The footings of abutments and wing walls are carried up to 3 feet below normal level of water and those of channel piers to 5 feet. The width of footings of the wing walls is 5 feet 3 inches, of the abutments 12 feet, and of the piers 9 feet 8 inches.

The piers above footings are battered 1 in 8 to 6 feet wide at top, with belt course extending 3 inches; bull-nosed ends protected with 5-16 inch plate iron. Owing to the depth of water (6 to 16 feet) and speed of current, unwatering for foundations was not attempted, but the beds for footings were cleared of all loose materials and to a satisfactory bottom. Cribs of 10x10-inch close fitting timber lined with 1-in. vertical matched sheathing, were lowered into position, weighed down and filled with concrete, deposited through a tube in 6-in. layers, well rammed, in which stone from 6 to 10 pounds weight were embedded.

The footings having been brought up to proper level, permission was obtained to lower the water sufficiently



Constructional View of Inverlea Bridge from East End, July 30, 1910.



to set the forms and build up to belt course. Owing to inconvenience to power plants by loss of head, this part of the work had to be carried on as quickly as possible, as the time allowed for low of level water was limited to 14 days. The concrete in footings consists of one part cement to seven parts gravel and sand, and generally in all parts above footings the composition is the same.

The false work for arches consisted of bents of 10x10 timber placed transversely with centre line of bridge and spaced 8 feet apart, centre to centre, with longitudinal stringers 4 feet apart on top, forming a deck level with spring line of arches. On this deck the centering was erected, consisting of laminated rings of 2-inch plank, bolted together with a section of 10x10 inches, supported on posts braced in both directions. On the rings was laid the lagging of 3-inch pine plank dressed and scribed to the radii of arches, all joints being calked. The concrete in arches consists of one part cement to six parts gravel and sand, built in voissoir sections, full width of bridge, commencing at spring of arch and working towards the centre and maintaining full depth.

The concrete in spandrel walls is composed of one part cement to seven parts gravel and stone. They are 18 inches thick at top, battered inside 1 in 4 and panelled outside 2 inches deep. The concrete in wing walls is of the same composition as spandrels. They are 18 inches thick at top, increasing by 9-inch steps at every 3 feet vertically.

The hand rail is composed of concrete one part cement to six parts gravel and sand. The part over arches is a balustrade of 6x8-inch balusters, with 6-inch spaces. That along the wing walls is solid, 8 inches thick. The base of railing is 16 inches wide by 15 inches deep. The cap is 12 by 8 inches. The railing is divided into sections by panelled pediments 2 feet wide by 4½ feet long, projecting 4 inches beyond faces of railing, one over each abutment and pier. The rail is terminated at outer ends of wing walls with posts 18x18 inches.

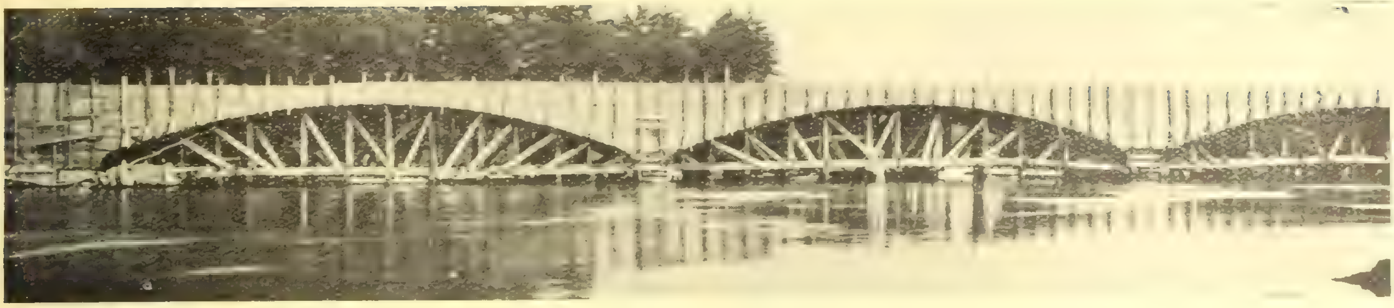
The faces of walls are relieved by a sailing course on the line of intrados of arch and projecting 2 inches beyond face. The forms for all parts above water, except arches and hand-railings, consisted of 2-inch pine plank, dressed, tongued and grooved, and painted with soft soap, posts and braces being of 4x4-inch pine, 30 inches apart.

All concrete above water was mixed and run as liquid as practicable to ensure filling. Expansion joints, tongue and groove, were made in spandrel walls and railings over each arch.

The reinforcing adopted throughout the structure consists of the Kahn System, manufactured by the Trussed Concrete Steel Company of Canada, Limited. The design conforming to the usual formula for parabolic arches, (although more eliptic than parabolic as designed) each arch is computed to have a rise of only one-tenth of span or 9.40 feet from springing line to the intrados at the crown. The actual rise, however, is 12 feet, thus giving an additional factor of safety which more than takes care of the difference in assuming the arch to be parabolic.

The horizontal component of thrust of one arch is neutralized by that of the adjoining arch and the effect is a downward thrust on the piers. This result is only obtained when the spans are equal and under the same conditions of loading.

Owing to the length of span it would have been practically impossible to have made the longitude steel reinforcing bars continuous throughout each arch. It was therefore important to enquire into the best position for splices in such members. Although it would be pos-



Inverlea Bridge from East Bank, looking up stream, July 30, 1910.

sible to splice two bars, to be embedded in concrete, so that the joint would be as strong as the bar, this is seldom done in practice. For this reason splices should be placed where the tension is least.

The severest loading of an arch of this type occurs when one half (from centre to abutment or pier) is under full load, while the other half is not loaded. Under these conditions the maximum tension occurs in the extrados at a distance of about one third of the span from abutment (or pier) at the unloaded end. This, therefore, is a point where the longitudinal reinforcing bars in the extrados should *not* be spliced. Under a central load, tension may be produced in these bars in the intrados of the arch, which is a point where *no* splicing should occur. In the design of this bridge the splices have been kept as far from these points as possible.

Owing to vibration caused by heavy moving loads, and the variations in stresses under varying conditions of loading, the danger of the reinforcing bars becoming loose in the concrete is provided against by the use of "Kahn" trussed bars. These form a perfect anchorage, having the long shear prongs bent into the body of the arch and attached rigidly to the main tension members.

The reinforcement of arches in intrados consists of 35 "Kahn" bars, 1 x 3 inches, and 12 inches centres, with prongs bent upwards 45 degrees; and in extrados 34 "Kahn" bars, 1 x 3 inches, 12 inches centres, with prongs bent downwards at same angle. These bars are 33 feet long with splices 2½ feet long. They are placed with extreme angle of rib 3 inches from surface of finished concrete.

A row of ½-inch bars 32 feet long and 9 feet apart are placed inside and adjoining intrados bars, with the same for extrados bars, the latter placed over middle of space of lower row. Intrados bars extend to centre of abutment body and cross the corresponding bar of next span over pier and to 8 inches from face of pier. Extrados bars extend to rear of abutment body and cross at piers as with intrados. Over each pier are set 11 saddle bars, 1x3 inches, 16 feet long, 36 inches apart centres and with prongs downwards.

The total weight of reinforcing steel in bridge is 70 tons. The upper surfaces of arches were painted with asphalt paint laid hot. The total amount of concrete in structure is 2,754 cubic yards. The cement used was "Monarch" brand, manufactured by the Lakefield Cement Company.

The contract prices were $9.30 and $11.22 per cubic yard for reinforced concrete in place, including forms, false-work and removal of same. The centering was struck 60 days after last of concrete (below hand rail) was laid. The gravel used in concrete was first grade clean gravel, with 35 per cent. of coarse, sharp sand, hauled three-quarters of a mile, costing 75 cents per cubic yard delivered.

Putting in Bottom for West Channel Pier.

Gravel filling for roadway was carried up to sub-

Inverlea Bridge, Peterborough.—Coffer Dam for West Abutment.

grade before the centering was struck. This will be topped with crushed stone next season. This gravel was procured from the Corporation gravel pit and was of a coarser grade than that used for concrete. Cost for loading, hauling and spreading was 36 cents per cubic yard, hauled three-quarters of a mile.

Drainage for road is provided for by 6-inch tile running from surface down through gravel filling and discharging vertically at each side of piers. The sidewalk has not been laid yet as it is intended to lay mains, for water and gas, and ducts, for wires, beneath it next season. The bridge is lighted by eight lamps on cast iron posts set on the pediments, the wires for which are conveyed in galvanized iron ducts built into base of railing.

The actual time occupied in erection was ten months, which included the removal of old bridge. The total cost when completed will be $35,000.

The bridge was designed by T. A. S. Hay, city engineer, and built by Messrs. Conroy Bros., and the construction was superintended by Inspector W. J. Martin, all of Peterborough, Ont.

Improved Municipal Government

Two addresses were given in Montreal last week by Mr. Clinton Rogers Woodruff, secretary of the National Municipal League of the United States, on "The New Municipal Idea," which he elaborated as one in which graft was eliminated and cities secured not only honest but efficient men to run their affairs.

The past twenty years, since the publication of Mr. Bryce's famous book on the American Commonwealth, he said, had marked a new era in national and municipal life in the United States, which had grown from a general pessimism of two decades ago to a spirit of hopefulness to-day. The National Municipal League had been organized in 1891, under depressing circumstances. But to-day they had over a thousand organizations working for the betterment of municipal conditions in all the larger cities.

"Twenty years ago," continued Mr. Woodruff," a grafter was regarded as a successful and shrewd politician, but to-day publicity and the growth of public opinion makes a recurrence of such a condition difficult, if not impossible. But we want more than that. We want not merely honesty, but efficiency in civic affairs. Civic business, like any other, needs men of abiilty who will devote their time, energies, and careers to the subject. In Germany this professionalism is recognized to the extent of having professional mayors and it is no infrequent thing to see a municipality advertising for a mayor.

As an example of the growth of the new municipal idea Mr. Woodruff stated that in the United States there were 100 cities under government by commission, while 200 more were seriously considering the matter. What was needed was not the practical politician, but simpler methods of city government.

To-day in most cities the mayor and officials recognized they were servants of the public, and wherever the people gathered to discuss public matters they were to be found. In various United States cities the mayors even went so far as to publish periodical journals, to tell the public what was being done with their money for the public good, while in New York a mayor elected by Tammany had organized a "Budget Exhibition," to show the people in simple manner what was being done. Further than this in the cities governed by commission the idea of party politics had been cut out, and the ballots did not mention whether candidates were Republicans, Democrats or anything but men anxious to serve the city.

The whole idea of the movement was democratic, to secure for the people honest and efficient government by the people, and he had been much impressed to find this same democratic principle in civic life as strong in Canada as in the United States.

"And here in Montreal," concluded Mr. Woodruff, "if democracy is to be triumphant and successful as in other cities it must be by the co-operation of every man, woman and child within your borders. We cannot depend upon any imposed government. Every one of us must recognize that we have a part in the upbuilding of the city, and success can only come by each taking his or her particular place in the machinery of civic life."

Concrete piers will be used by the Westholme Company, of Victoria, in constructing the large government wharf at Prince Rupert. At the present time the only other place where the concrete pile is in use is in San Francisco, where it has proven to be a great success. In the great southern port the piles used range from 16 to 20 feet in length, but at Prince Rupert the great depth of water will necessitate a minimum length of 40 feet and a maximum of 100 feet. With their tremendous weight no driving will be required and they are so constructed that once the bottom is reached a firm and solid basis is assured through a suction tube through which all the loose mud and deleterious matter can be drawn to the surface. Each pile is sixteen inches square. The centre is perforated by a steel pipe which runs right through. This is for extracting all the matter between the bottom of the pile and the solid rock. Round the tube are placed four reinforcement girders which play the part of grapplers. In order to render them stiff and immovable they are circled by stays at intervals of five feet. Outside these steel ribs is placed a closely latticed network of wire to give the concrete a groundwork. A huge derrick will place the piles in position, a task that will entail a considerable amount of power as the average weight of the piles is about sixteen and a half tons.

The business men and other level-headed citizens of Vancouver rejoiced at the recent announcement that the Vancouver Dry-dock and Shipbuilding Company had definitely undertaken the construction of a huge drydock at Roche Point, on the north shore of Burrard Inlet, some miles east of the city at a cost of $1,214,154. The dock is to be started within six months and completed by December 1st, 1912. The Dominion government will grant the usual subsidy of 3½ per cent. for twenty-five years on cost of construction providing the stated conditions are complied with. It is likely that the Grand Trunk Pacific Railway Company will apply for a subsidy for a similar dock at Prince Rupert, as the British Columbia fleet of ocean and coasting steamers is increasing so rapidly that two docks will be necessary in the near future.

Next summer Granville street, Vancouver, will be extended and paved clear through to the north arm of the Fraser on the south, making a thoroughfare six miles in length. From the present city boundary the work is being carried through by the Provincial Government and the C. P. R. for he benefit of their Point Grey holdings.

Organization of Road Building in Canada

With Special Reference to the Methods Employed in Ontario—Provincial Aid to County Roads—Success of Prison Labor*

By W. A. McLean, Provincial Engineer of Highways for Ontario

Road building is a matter of admittedly great importance throughout Canada. As with the United States, we have a country of magnificent distances, and adequate provision for transportation is an important factor in national development.

Road construction from the standpoint of climate, topography, material, and traffic shows great diversity. We have moist climate, and dry climate; extremes of cold and heat; the mountains of British Columbia come into close contact with the level prairies of Alberta, Saskatchewan and Manitoba. Through Ontario and Quebec, to New Brunswick and Nova Scotia the country varies from mountainous and forest covered, to fields of rolling fertility. Through the prairies there is a "log drag" area where road metal is non-existent. In other districts the metal available varies from Laurentian granite to limestone or more recent glacial deposits of gravel. Traffic in some cases is that of automobile travel between large cities; in others that of the strictly rural highway; in others the prairie or forest trail, or the mining road over mountains and muskegs. The road question is with us, in all its varying forms.

Road making in Canada, with some exceptions, has been a strictly municipal function until the last decade. In that period practically all provincial governments have adopted some measure of provincial legislation equivalent to state road laws. In some cases it amounts merely to engineering advice and instruction; in others it is a substantial measure of provincial aid. None of these laws are, as a rule, modeled after those of another province, or of another country, but have grown, as it were, from the native soil, according to local requirements and conditions.

Thus the laws of Quebec are framed to harmonize with old French customs, chief of which was that each farmer should be responsible for the road in front of his property. In Nova Scotia the feeling of the people has been trained to accept provincial measures. In Ontario, ideals are more favorable to local government so that the provincial authorities have not moved along the line of provincial aid as fast as would be possible in other provinces and states. The federal government of the Dominion does not give aid to road building, nor does it maintain an office in any way similar to the Office of Public Roads at Washington.

The Ontario System

It is with respect to Ontario that I am best qualified to speak, having charge of the highway division of that province, a branch of the Provincial Department of Public Works. Roads in Ontario are constructed under three different systems or organizations:

1. By townships.
2. By counties.
3. Colonization roads by the provincial government.

To an understanding of these, it is to be explained that the province of Ontario is divided into two almost distinct parts: (1) Southern or Old Ontario, lying south of a line drawn due west from Ottawa to Penetanguishene, covers an area of 35,000 square miles. This district is closely populated and is devoted almost wholly to agriculture. (2) Northern or New Ontario, including the whole of the province north of the line between Ottawa and Penetanguishene comprises an area of over 100,000 square miles. This district is sparsely populated; is for the most part rough and broken, and while some parts are suitable for agriculture, it is chiefly as yet devoted to mining and lumbering.

Township System in Southern Ontario:—The greater mileage of roads in the older part of Ontario is under the control of the township councils. These township roads are maintained solely by township expenditure raised by direct taxation, supplemented by statute labor. In numerous townships statute labor is commuted or wholly abolished and road construction placed on an entirely cash basis.

In the near future statute labor will undoubtedly be done away with by all townships, as I believe that public feeling is strongly turning toward that end. I have recently shown that township councils spent last year in cash, on purely township roads, over $1,400,000, and over 1,100,000 days of statute labor, equal at least to $2,500,000. In the next ten years townships will at this rate spend twenty-five million dollars, and unless better methods are followed there will be little of permanent value from this outlay. Under more efficient methods of managing labor, which I hope to see adopted, such an outlay should produce substantial improvement, and although our people are conservative, it remains to appeal to their good judgment to attain the object looked for—an entire cash system under a permanent road superintendent in each township.

Provincial Aid to County Roads

The distinctly "good roads" work of Ontario, in addition to educational measures, is in connection with county council management. The act to "Aid in the improvement of Public Highways" provides for the establishment of county systems of highways, these to be aided by the provincial government to the extent of one-third of the cost of construction. These roads are built under government regulations, and are subject to government inspection, but otherwise county councils have control of the entire expenditure. The best and more expensive macadam roads in the province are being built under this system.

Under this act, a county council may assume the main roads within the county, usually comprising from 12 per cent. to 15 per cent. of the road mileage in each township. These roads are built in a permanent manner, the work being in charge of a superintendent or engineer appointed by the county. At the end of each year the county treasurer transmits to the Provincial Highways Division a statement of the county road expenditure. One-third of this amount is then paid to the county, through the provincial treasurer. The work is carried on from year to year by the county, and annual payments are made by the province until the county system is constructed in a durable manner.

To the present time about 1,200 miles of road have been built under this act, and the beneficial results are becoming apparent. For $2,500,000 more permanent results have been accomplished than by township councils in the past twenty years, with an expenditure estimated at thirty millions.

One feature of the provincial grants is that they are not distributed according to any schedule of assessment, population, or area. The only basis is the cost of the roads, and the amount county councils are willing to spend on them. The provincial grant includes one-third of the cost of bridges, so that as compared with some state laws, the Ontario proportion granted seems nearly equal one-half. Rivers and streams are large and numerous and the bridges being built are of a substantial type, consisting of reinforced concrete arches reinforced concrete beams with concrete floor; or steel trusses with concrete floors and abutments. To receive the provincial grant, bridges are to be built under the general specifications of the Highways Division.

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*Presented at the Annual Convention of the American Road Builders' Association.

Roads of Northern Ontario

Colonization roads are constructed under a colonization road act, which is applicable solely to northern Ontario. This act may be divided into two parts:

1. The grants and expenditure made solely by the provincial government under officials and foremen appointed by the provincial government. These are the only roads built solely by the provincial government, and vary in character from well graded forest roads to heavy macadam, well rolled and drained.

2. The second system of procedure under the "Colonization Road Act," is one whereby any organized township in northern Ontario may vote a sum to be spent on a certain road or roads. A provincial grant of from one-third to two-thirds of the township expenditure is made under this plan. The total provincial expenditure on colonization roads and bridges in 1909 was about $700,000.

Prison Labor on Roads

An especially interesting departure in Ontario at the present time relates to prison labor for road purposes. Each county in the province has a county jail in which are confined short term prisoners. To relieve the county jails, the province maintains a central prison, where convicts with terms of from three months to two years are detained. For terms exceeding two years convicts are sent to the federal penitentiary at Kingston.

The existing provincial prison having become inadequate, the present provincial secretary, Hon. W. J. Hanna, conceived the idea of a prison farm. This, recently purchased, contains 800 acres of land, and was chosen not only for its farming possibilities, but for its value, in part, as a stone quarry, where it is intended to crush stone for use on roads built or aided by the province.

For the past season from 180 to 200 prisoners have been kept in temporary quarters on this farm, cultivating, cleaning up, building workshops and constructing a concrete bridge 148 feet in length. Roads through and around the farm will be among the first works undertaken, in order that as a prison farm, any part can be quickly reached. Railway switches are to be put in, and arrangements for the shipment of crushed stone are proposed in due course, as the permanent buildings needed on the farm become completed.

In northern Ontario, rather than bring men several hundred miles to the central prison, they have been sent into the northern districts to open roads through bush, mining, and as yet sparsely occupied country. Two camps have been maintained of about fifty prisoners each, and four guards with each camp.

Both at the prison farm in southern Ontario and at the colonization road camps in northern Ontario, there are one or two features which have attracted wide attention. The prisoners are given plenty of wholesome and appetizing food such as some of them would not get for a Sunday dinner at home. The guards do not carry a weapon of any kind. Instead of being "guards" in the ordinary sense, they are working foremen, leading and inspiring the men, instead of driving them.

One misses the sullen abject despair that so often characterizes prison life. The prisoners are, as a rule, sent down for minor offenses, more often the result of drink or ban associates than a criminal disposition.

With constant, healthful employment, good food and good leadership, prisoners coming to the farm and the road camps physical wrecks, are sent away at the end of their terms vastly better physically, and, therefore, we believe, better morally. They have been taught how to do an honest day's work.

Without any sentimental view as to the desirability of punishment, it is, after all, results we are looking for. My contact with this work for the past season has been intimate and I am strongly impressed with the belief that experience in Ontario will show that a new era has been reached in the treatment of a large class of prisoners to the betterment of themselves, society, and the roads.

County jails have usually from three to a dozen prisoners confined. A description of our convict work would not be complete were the case of one Ontario county omitted, in which the prisoners are employed in making concrete tile for road culverts. The necessary materials, gravel, cement, collapsible forms, etc., are kept inside the jail yards and pipes up to three feet in diameter are sold at a low rate to the local municipalities or are used on county roads.

To this I must add that public feeling in favor of better roads is fast gaining ground in Ontario, and what the future may bring is hard to foretell. One citizen, Mr. J. C. Eaton, and the company of which he is president, under my direction has spent $20,000 in building a sample road three miles in length adjacent to Toronto. We have active roads organizations, doing educational work. The city of Toronto has introduced a by-law, which I believe will be ratified, to grant $100,000 to aid the improvement of county roads adjacent to and radiating from the city.

Comparatively few farmers in Ontario as yet use automobiles but the number is steadily growing. The motor principle is destined to a tremendous application to highway traffic, and in my opinion that day, with the consequent demand for good roads, is approaching so rapidly that it may be doubtful policy to force public opinion too urgently at the present time, as a demand may readily be reached beyond the ability of a government to satisfy.

Exhibit of Engineering Instruments at Winnipeg

The Eugene Dietzgen Company, Limited, had a noteworthy exhibit of engineering instruments at the Royal Alexandra Hotel last week during the convention of the Canadian Society of Civil Engineers. An instrument that received most favorable comment was the Percenter Level, which has been designed to afford a ready means of determining quickly and accurately with but one operation the grade per cent. between any two points, without measuring the distance between the same and without any calculation or reference to tables. The instrument appealed particularly to railroad engineers and road builders on preliminary work.

The railroad dumpy shown was a low priced but serviceable instrument possessing a good quality telescope, length 15 inches, magnifying power 25 diameters, achromatic terrestrial, powerful and of good definition, with a sensitive level vial, weight 7½ pounds.

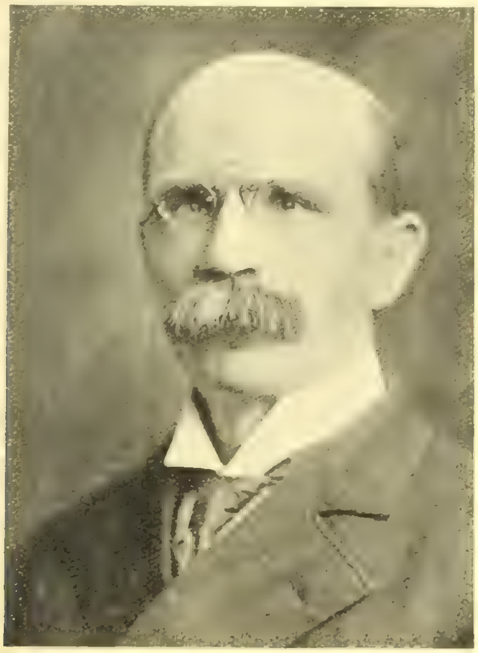
A new 3-screw transit and a high power telescope were also shown. Additional features were a rail profile machine for determining the wear of any rail within a few minutes without taking out the rail, cutting or distributing the roadbed, and the Noyes draughting machine, which eliminates all lost motion. A general line of up-to-date engineering instruments made up the balance of an interesting exhibit.

At the meeting of the Montreal Art Association last week, the secretary, Mr. J. B. Abbott, stated that in order to obtain the highest possible type of a modern art gallery and school of art, it was decided to appoint Mr. E. M. Wheelwright, of Boston, to pronounce upon the merits of certain plans submitted to him in competition, and to act in conjunction with the successful architect in the preparation of the final plans. The competition was decided in favor of Messrs. Edward and W. S. Maxwell, and as Messrs. G. A. Fuller, Co., Ltd., of New York, were found to be the lowest tenderers the contract for the erection of the whole building in marble for $301,087, was awarded to them.

Civil Engineers' Convention at Winnipeg

Record Gathering in the Western Metropolis—Enthusiastic Reception by the City—The Proceedings: Reports, Discussions, Papers, New Officers

The twenty-fifth annual meeting of the Canadian Society of Civil Engineers, which was held at the Royal Alexandra Hotel, Winnipeg, January 24-27, was attended by nearly 300 members, a considerable number of whom were accompanied by ladies. Special arrangements had been made for the transportation of members from eastern and western points, and the response to the Society's invitation was a source of much gratification to the indefatigable secretary, Professor McLeod, and the general directorate of the institution. A perusal of the list of members present, published below, will demonstrate the representative nature of the attendance.



City Engineer Rust, of Toronto, the new President of the **Canadian Society of Civil Engineers**

Those Present:

H. N. Ruttan, Winnipeg.
C. H. Rust, Toronto.
J. Galbraith, Toronto.
John Kennedy, Montreal.
Wm. Kennedy, jr., Montreal.
W. P. Anderson, Ottawa.
G. A. Mountain, Ottawa.
G. H. Duggan, Montreal.
Duncan MacPherson, Ottawa
L. A. Herdt, Montreal.
C. H. McLeod, Montreal.
R. J. Durley, Montreal.
R. F. Uniacke, Ottawa.
W. Chase Thomson, Montreal
Chas. H. Dancer, Winnipeg.
Edward P. Fetherstonhaugh, Winnipeg.
W. V. Taylor, Quebec.
E. E. Brydone-Jack, Winnipeg.
E. Brandon, Toronto
F. M. Davis, Windsor, Ont.
Harry B. Miller, Montreal.
C. Loch Trimingham, Montreal.
A. Don Swan, Montreal.
H. A. K. Drury, Winnipeg.
H. L. Johnston, Winnipeg.
F. G. Earle, University of Manitoba, Winnipeg.
G. W. N. Day, Toronto, Editor Contract Record.
N. B. McTaggart, Winnipeg.
A. L. McDougall, Ottawa.
H. Saltzman, Winnipeg.
J. N. de Stein, Rivers.
W. E. Hobbs, Winnipeg.
Geo. E. Bell, Winnipeg.
S. G. Karlan, University of Manitoba, Winnipeg.
J. R. Reid, Colonsay.
R. G. Saunders, Moose Jaw.
B. S. McKenzie, Winnipeg.
E. F. Chandler (Am. Soc. C. E.), University of North Dakota.
Guy C. Dunn, Winnipeg.
N. E. Brooks, Calgary.
K. S. Patrick, Winnipeg.
J. B. Phillips, Winnipeg.
Newton Wallis, Winnipeg.
F. St. C. Farran, Edmonton.
E. H. Harrison, Winnipeg.
Geo. A. Bayne, Winnipeg.
W. Z. Earle, Winnipeg.
T. C. Irving, jr., Toronto.
A. S. Innes, Winnipeg.
De Gaspe Beaubien, Montreal.
J. A. Strumbert, Montreal.
M. P. Blair, St. Boniface, Man.
J. C. Holden, Winnipeg.
Frank Lee, Winnipeg.
Joseph Labelle, Montreal.
W. G. Chace, Winnipeg.
Matthew Neilson, Montreal.
J. Duchastel, Montreal.
Harold A. Baylis, Montreal.
Henri Dessaulies, Montreal
F. B. Fripp, Sault Ste Marie, Ont.
J. R. Freeman, Moncton, N.B.
G. E. Howie, Fredericton, N.B.
G. W. Volckman, Ottawa.
G. Ridout, Toronto.
T. Aird Murray, Toronto.
J. Hammersley-Heenan, Montreal.
Donald A. Ross, Winnipeg.
W. Archibald Duff, Winnipeg
W. H. Munro, Peterborough, Ont.
A. J. McDougal, Ottawa.
F. S. Lazier, Campbellford, Ont.
D. C. Tennant, Montreal.
F. P. Shearwood, Montreal.
H. M. Balfour, Frankford, Ont.
H. B. Muckleston, Calgary, Ala.
J. P. Menard, Montreal.
Arthur W. Sullivan, Valleyfield.
Eugene O'Sullivan, Montreal.
Patrick O'Sullivan, Indian Lorette, Que.
F. J. McIntosh, Winnipeg.
Aurelien Boyer, Montreal.
E. A. James, Toronto, Editor Canadian Engineer
F. A. Creighton, Prince Albert.
Norman M. McLeod, Toronto.
G. G. Powell, Toronto.
J. M. Wilson, Moose Jaw, Sask.
William Storrie, Toronto.
A. R. Dufresne, Ottawa.
W. Hollingworth, Toronto.
A. E. Jupp, Toronto.
F. A. Wilkin, Winnipeg.
F. Crossley, Winnipeg.
O. F. Fischer, Cochrane, Ont.
Horace Longley, St. John, N.B.
R. H. Cushing, St. John, N.B.
C. W. Archibald, Truro, N.S.
J. T. Bertrand, Isle Verte, P.Q.
E. B. McLean, Moncton, N.B.
of Manitoba, Winnipeg.
H. Cashdan, University of Manitoba, Winnipeg.
C. C. Chataway, Winnipeg
W. B. Young, Winnipeg.
A. J. Papineau, Winnipeg.
W. M. MacPhail, Winnipeg.
W. E. Jenkins, Edmonton.
H. B. Fergusson, Vancouver.
T. R. Deacon, Winnipeg.
Phillip J. Duff, Montreal.
G. W. Goodall, Winnipeg.
Sherman Smith, Melville.
N. S. Tate, Watrous.
H. A. Bowden, Watrous.
H. L. Bodwell, Calgary.
L. H. S. Taunton, Winnipeg.
M. B. Henselwood, Winnipeg
S. Wilkins, Winnipeg.
W. W. Bell, Fort William.
F. A. V. Cowley, Victoria.
C. W. Hookway, University of Manitoba, Winnipeg.
R. Cruickshank, University of Manitoba, Winnipeg.
J. H. Irvine, University of Manitoba, Winnipeg.
T. W. White, Winnipeg.
James White, Ottawa.
L. R. Gransaull, Wainwright
Geo. F. Richan, Vermillion Bay.
J. A. Douglas, Winnipeg.
A. R. Greig, Saskatoon.
F. H. Girdlestone, Winnipeg.
W. A. James, Winnipeg.
John Irvine, Vancouver.
J. D. Ruttan, University of Manitoba, Winnipeg.
R. W. Bellhouse, University of Manitoba, Winnipeg.
Wm. D. Knox, University of Manitoba, Winnipeg.
Leslie R. Thomson, University of Manitoba, Winnipeg
Thos. W. Brown, Saskatoon.
J. H. McKenzie, Superior Junction.
R. F. Howard, Winnipeg.
F. T. Bagshawe, Winnipeg.
R. D. Willson, Winnipeg.
Hugh D. McKinnon, University of Manitoba, Winnipeg
J. P. Fraser, University of Manitoba, Winnipeg.
W. H. Richardson, University of Manitoba, Winnipeg
N. L. McLeod, University of Manitoba, Winnipeg.
H. O. Canfield, Point du Bois
H. I. Morris, University of Manitoba, Winnipeg.
H. A. Bayne, University of Manitoba, Winnipeg.
G. Halstead, University of Manitoba, Winnipeg.
W. L. McIntosh, Winnipeg.
V. H. Tait, University of Manitoba, Winnipeg.
B. S. Johnston, University of Manitoba, Winnipeg.
W. J. Dickson, University of Manitoba, Winnipeg.
C. N. Mitchell, jr., University of Manitoba, Winnipeg.
Wm. C. Fingland, University of Manitoba, Winnipeg.
D. T. Croll, University of Manitoba, Winnipeg.
John R. Black, Winnipeg.
Alex. Taylor, Portage la Prairie.

D. M. Mawhinney, University of Manitoba, Winnipeg
A. J. Taunton, University of Manitoba, Winnipeg.
G. L. Shanks, University of Manitoba, Winnipeg.
T. L. Roberts, Winnipeg.
C. W. U. Chivers, Winnipeg.
R. H. O'Reilly, University of Manitoba, Winnipeg.
L. Easton, University of Manitoba, Winnipeg.
S. J. Fisher, Montreal.
Alfred J. Stevens, Winnipeg.
L. F. Grant, Prince Rupert, B.C.
M. H. McPhee, Superior Jct., Ont.
W. W. Mack, Hardwick, Vt.
C. W. Dill, Toronto.
Victor Michie, Winnipeg.
A. J. Riddell, Winnipeg.
James Riddell, Winnipeg.
H. J. Lamb, London, Ont.
W. C. Trotter, St. Johns, P.Q.
Frederick H. Fay, Boston, Mass.
A. McGillivray, Winnipeg.
F. A. W. MacLean, Winnipeg
H. A. Bowman, Winnipeg.
H. A. Alexander, Winnipeg.
C. Donnelly, Winnipeg.
J. J. Aldred, Winnipeg.
E. W. M. James, Winnipeg.
A. K. Grimmer, Medicine Hat
G. H. Burbidge, Montreal.
J. T. Farmer, Montreal.
S. S. Oliver, Quebec.
H. Lumsden, Winnipeg.
L. B. Elliott, Calgary, Alta.
G. McPhillips, Winnipeg.
J. R. Grant, Vancouver, B.C.
F. F. Busteed, Vancouver.
F. C. Laberge, Montreal.
S. R. Poulin, Winnipeg.
S. H. Reynolds, Victoria, B.C.
F. W. Anderson, Ottawa.
J. V. Dillabough, St. Boniface, Man.
E. D. Allen, St. Boniface, Man.
K. R. Chestnut, Edmonton, Alta.
F. Sedziak, Winnipeg.
A. L. Mieville, Winnipeg.
J. F. Earl, Superior Jst., Ont.
L. C. Jacobs, Superior Jct., Ont.
J. G. Legrand, Winnipeg.
H. F. McDonald, Winnipeg.
W. H. Jones, University of Manitoba, Winnipeg.
Herbert Auger, University of Manitoba, Winnipeg.
J. C. Munro, University of Manitoba, Winnipeg.
W. S. Wallace, University of Manitoba, Winnipeg.
W. S. Collins, University of Manitoba, Winnipeg.
C. B. Sharpe, University of Manitoba, Winnipeg.
L. Betourney, University of Manitoba, Winnipeg.
H. R. Urie, University of Manitoba, Winnipeg.
J. F. Leslie, University of Manitoba, Winnipeg.
E. A. Childerhose, University of Manitoba, Winnipeg.
W. T. Mawhinney, University
D. A. Evans, St. Boniface, Man.
G. A. McCarthy, Calgary, Alta.
J. W. Harris, Winnipeg.
W. L. MacKenzie, Winnipeg.
J. R. C. Macredie, Winnipeg.
M. C. Burr, Vancouver, B.C.
A. A. Young, Montreal.
A. S. Dawson, Calgary, Alta.
C. M. Arnold, Lethbridge, Alta.
C. Hoard, Victoria, B.C.
G. H. Power, Winnipeg.
J. Chalmers, Edmonton, Alta.
W. P. Morrison, Maple Creek, Sask.
W. R. W. Parsons, Regina, Sask.
R. J. Leckie, Regina, Sask.
Dr. Martin Murphy, Edmonton, Alta.
C. Ewart, Edmonton, Alta.
C. E. Cartwright, Vancouver, B.C.
E. A. Johnson, Vancouver, B.C.
W. Muir Edwards, Edmonton, Alta..
F. DeC. Davies, Winnipeg.
R. C. Smith, Saskatoon.
Thomas C. McNabb, Winnipeg.
M. J. Haney, Toronto.
E. A. Forward, Winnipeg.
H. L. Bucke, Port Arthur.
A. W. McMaster, Winnipeg.
H. A Zimmerman, Winnipeg
A. J. Dostert, Winnipeg.
E. R. B. Pike, Winnipeg.
A. Q. Cavanagh, University of Manitoba, Winnipeg.
W. W. Dynes, jr., University of Manitoba, Winnipeg.
C. Shandon, University of Manitoba, Winnipeg.
D. T. Townsend, Winnipeg.
L. B. Merriam, Winnipeg.
W. W. Mack, Hardwick, Vt.
J. W. Dorsey, University of Manitoba, Winnipeg.
R. E. Speakman, Brandon, Man.
Chas. MacIntyre, Editor of Western Can. Contractor.
F. M. Lawledge, Winnipeg.
K. J. C. Zinck, Winnipeg.
M. P. Cotton, Vancouver.
D. McMillan, Winnipeg.
G. N. Otty, Fort William, Ont.
G. S. Roxburg, University of Manitoba, Winnipeg.
J. Woodman, Winnipeg.
M. H. MacLeod, Winnipeg.
C. Harry Fox, Fort William, Ont.
J. A. Hesketh, Winnipeg.
A. A. McCoubrey, Winnipeg.
A. Rimmington, University of Manitoba, Winnipeg.
John Callaghan, Winnipeg.
H. F. H. Hertzberg, Winnipeg.
A.H. Aldinger, Winnipeg.
W. McCartney, Winnipeg.
H. A. Woods, Montreal.
M. C. MacFarlane, St. Boniface, Man.
E. S. Miles, Lockport, Man.
Robert I. Lothian, University of Manitoba, Winnipeg
William Burns, Winnipeg.
A. H. O'Reilly, Winnipeg.

The Toronto members left at 9.30 a.m., Saturday, January 21, in a special car attached to the regular Ottawa train. At Carleton Place connection was made late in the afternoon with the special train from Montreal. The renewal of old friendships and the many reminiscences that were going the round stimulated the spirit of genuine enjoyment that makes the hours fly, and the pleasures of the way alone were commented upon. Montreal and Toronto to Winnipeg in mid-winter is not calculated to inspire one with a great deal of enthusiasm, but had the scenery been of an Alpine character in its impressiveness it is scarcely probable that it would have received much attention. There was so much to be heard and told that the outside world mattered little until the end of the journey. (This, of course, with apologies to the "Fresh Air Brigade," who defied the elements at White River, Schreiber and other historic points along the route).

The eastern delegates arrived at Winnipeg about ten o'clock on Monday morning, January 23, and the majority of the western members put in an appearance the same day.

News of the death of Mr. J. E. Schwitzer was received on the Monday morning and left a feeling of personal loss with every member of the Society. A sketch of the career of Mr. Schwitzer is published elsewhere in this issue.

Mr. C. E. W. Dodwell, of Halifax, one of the new Vice-Presidents.

At the opening session on Tuesday, January 24, the President, Col. H. N. Ruttan, paid a feeling tribute to the memory of Mr. Schwitzer, and proposed the passing of an official resolution as an expression of the Society's deep regard. This resolution, which is given below, was subsequently introduced by Mr. John Kennedy, of Montreal:

> "Be it resolved that the members of the Canadian Society of Civil Engineers assembled in annual meeting in Winnipeg, desire to take the opportunity of expressing their sorrow on hearing of the sudden death of Mr. J. E. Schwitzer, one of the most distinguished of the members of the society. Their sorrow is emphasized by the fact that he had just received promotion to the chief engineership of the Canadian Pacific Railway, which appointment marked the appreciation of a great corporation for one of its most able and devoted officers. Mr. Schwitzer was one of the most manly, loveable, and popular members of the society, and his death is mourned by each member as a personal loss.
>
> "Be it resolved that the society respectfully begs to express its deepest sympathy with Mrs. Schwitzer in her great bereavement, and that a copy of the above resolution be forwarded to her."

The proceedings on the first day were mainly of a routine character. The morning session opened with the reading of the minutes of the last convention by the Secretary, Professor McLeod. These were approved, and afterwards the reports of the Quebec, Ottawa, Toronto and Manitoba Branches were received in turn and adopted.

Reports of Branches.

The Quebec Branch, which has a membership of 49 corporate members, four Student Members and two Associates, held ten meetings during 1910. The following extract from its report may be of interest:

> It is felt that the members of the Society in the Province of Quebec do not enjoy the protection which they are entitled and have a right to look forward to, according to the charter of the Society. In many cases, it has been brought to the attention of the Quebec Branch of the Society, that engineers who do not belong to the Canadian Society of Civil Engineers, have been brought in from foreign countries, to carry on important engineering works, which, it is felt would have been equally as well looked after by Canadian engineers, members of the society.
>
> It is generally felt among the members of the Quebec Branch that stricter measures should be taken to enforce the carrying out of our by-laws, which provide that no engineer, not a member of the Canadian Society of Civil Engineers, although such may be a graduate of some university, is entitled to practice as an engineer in the Province of Quebec without complying with the by-laws.

The Ottawa Branch, at the close of 1910, had a total membership of 228. During the year many interesting papers were given, and the report furnished ample evidence of the enthusiastic manner in which the Branch is supported by its members. The recommendations of special interest contained in this report were as follows:

> We recommend that the Council consider if some means may be devised whereby assistance of some kind may not be given to branches to form local libraries in order that members of branches, who will be, under proposed amendments to by-laws, considered as resident members, may derive more of the benefits of resident members in Montreal.
>
> We recommend that papers of merit read before branches should be published in the Transactions of the Society when desired by the Branch, subject to censorship at headquarters instead of compelling authors to read at Montreal first in all cases.
>
> We recommend that the mode of election of officers and council be considered with a view of giving branches representing the various districts some voice in the selection of the members of the Nominating Committee.

The Toronto Branch reported a total membership of 275. Its meetings during 1910 were held at the Engineers' Club, 96 King street west. The new executive will have to secure fresh quarters for 1911, owing to the launching of a new organization, which is to become the successor of the club just referred to. A number of valuable papers were given last year. Addresses are secured from eminent engineers in Toronto and other cities in addition to the usual discussions of papers delivered before the parent society.

The following recommendation contained in the report of the Manitoba Branch was discussed at some length and was productive of a resolution urging the importance of the suggestion upon the incoming Council:

> The members of the Branch wish to recommend that the by-laws of the Society be revised so that papers which have been read before the Branches of the Society may be published in the Transactions, providing the Council consider them worthy of publication.

The total membership of the Manitoba Branch is 166. The officers for the current year are as follows: Chairman, C. H. Dancer; Executive Committee: E. P. Featherstonhaugh, J. A. Hesketh, T. Turnbull and Col. Ruttan.

The remainder of the Tuesday session was devoted to the reception and brief discussions of the reports of the special committees.

Discussion on Sewage Disposal.

An interesting discussion ensued upon the presentation of the report on Sewage Disposal, Messrs. Rust, Murray, Kennedy and Col. Ruttan taking part.

City Engineer Rust opposed the adoption of the report on the ground that the principles advocated therein might be accepted by municipalities as having the sanction and general approval of the Society, whereas with the varying conditions existing throughout the country individual treatment was essential. Concerning the Provincial Boards of Health Mr. Rust was disposed to criticize the formation of these bodies inasmuch as in the majority of cases they were composed of medical men who had not made a special study of sewage disposal. In his opinion, such boards should be supplemented by the appointment of a consulting engineer properly qualified to give reliable advice.

Mr. T. Aird Murray remarked that he was somewhat disappointed in the report inasmuch as the principal adopted therein was the very opposite to that which he had inaugurated in the province of Saskatchewan. The report did not appeal to him as being up-to-date, for it concluded that it was impracticable to so treat sewage that the danger of transmission of typhoid by effluents could be satisfactorily met. For this reason the committee recommended that sewage disposal plans should proceed no further in treatment than that which is covered by the processes of sedimentation and removal of the tendency to putrefaction of the organic matter, and that the onus of removing disease infection from water should be met entirely by those using water mixed with sewage, for purposes of domestic water supply.

Mr. Murray pointed out that the acceptance of such a principle in the report was a practical acknowledgement that sewage disposal was a failure in its most essential requirement—that of eliminating the risk of infecting waters with typhoid bacteria. Further, he pointed out that apart from the larger cities it was impossible or impracticable to install efficient methods of water purification because of the great expenses in first cost and in maintenance. Also, that in many cases the people who suffered from polluted streams were the farmers and isolated rural communities on such streams. In fact, that many epidemics of typhoid were caused in cities by returning the sewage to the city by means of milk from such rural centres, where milk cans were washed by the very water which contained infected city sewage.

The policy adopted in Saskatchewan, said Mr. Murray, was that of not only eliminating from sewage the aesthetic nuisance, but also the sanitary, or pathogenic; therefore, as a final adjunct to any sewage disposal scheme, the hypochlorite method of disinfecting or sterilizing the sewage was insisted upon. He held that it was practical and easy with our newer knowledge of disinfecting processes to procure sewage effluents entirely free from disease infection, and that municipalities and others would be more likely to vote for such complete schemes than for the measures proposed in the committee's report.

Finally, it was decided to defer the adoption of the report on sewage disposal pending further consideration and investigation by the Special Committee.

Complimentary Luncheon, January 24.

A complimentary luncheon given on January 24 by the Mayor (Mr. Sanford Evans) and Aldermen of the City of Winnipeg, was attended by upwards of four hundred members and their friends, and was a most enjoyable function.

In his address of welcome Mr. Evans made a feeling reference to the late Mr. Schwitzer, who, he said, had laid, during recent years, the foundations of the material development of the West. He deplored deeply the early closing of such a notable life.

Mr. Evans, continuing, said that the profession as a whole was playing a most important part in Western Canada and that its members were to be complimented on the manner in which they had gained the confidence of the public. In Col. Ruttan they had a leader of great personal integrity and efficiency. There were many evidences of Winnipeg's practical interest in industrial development and their best efforts were being put forth on behalf of technical education. Also, they were endeavoring continually to make Winnipeg clean, sanitary and attractive.

"Throughout the city," said Mr. Evans, "there is an active and intelligent interest in the subject of engineering. We realize the work you can do and the importance of the projects committed to your direction. The city of Winnipeg's work at Point du Bois has been undertaken in order to provide, at the lowest cost, that great fundamental of modern progress—power. The school board of Winnipeg has taken a noteworthy step in advance, in the construction of two properly equipped technical schools, now under erection. The Provincial Government has appointed a commission which is working independently of that appointed by the Dominion Government. We have many undertakings in the West and we have always sought for the best and most modern solutions.

Col. Ruttan, Mr. C. H. Rust and Col. Anderson replied briefly on behalf of the Society.

Col. Anderson, who said that he had some claim to consideration as an "old timer," gave a few interesting reminiscences. He had been a student in Manitoba College in 1873 and the journey west, over the Dawson road, had taken him three weeks. The only other means of approach meant a wagon trip of 500 miles, or steamboat down the winding Red River. He was greatly impressed with the developments of the intervening time. The Colonel dwelt briefly upon the intimate relation of Winnipeg's growth to the prosperity of the whole Dominion.

On Tuesday evening the ladies and members were entertained by the Women's Canadian Club of Winnipeg.

Winnipeg's Great Work at Point du Bois.

On Wednesday, January 25, the majority of the members paid a visit of inspection to the city power plant at Point du Bois, situated 77 miles from Winnipeg. The journey was made in a special train of ten cars provided by the C.P.R. Luncheon was served en route. The work at Point du Bois, a description of which was published in our issue of January 18, is well advanced and the plant is expected to be in operation this summer. Mr. W. G. Chace and several members of his staff accompanied the party and furnished information relating to design, construction and progress. An interesting feature was the method of carrying on the concrete work, the prosecution of which had been accomplished (with the thermometer registering, at times, 34 degrees below zero) by means of a canvas shelter, beneath which the temperature varied from about 3 to 20 degrees above freezing point. At time of writing the concrete roof of the main section of the power house has just been completed. The roof is 53 by 250 feet in area and has been laid with concrete 4½ inches thick. This will be covered with three layers of burlap and asphalt, with a gravel surface. The greatest interest was manifested in the project, and Mr. Chace and his staff, together with Controller Cockburn and the other civic officials who accompanied the party, were highly complimented upon the enterprising and resourceful nature of the scheme. The work will involve a total expenditure of some $4,000,000, which, as Mayor Evans pointed out at the banquet held in the evening, is a sum greater than that which is being spent by the whole Province of Ontario in its hydro-electric undertaking. The party from Point du Bois returned to headquarters, the Royal Alexandra, shortly after seven o'clock in the evening.

Visits were also paid by some of the members to the St. Andrews Locks and to the G. T. P. shops now under construction at Transcona. The many interesting features of the former work will be familiar to the majority of our readers and we hope to furnish a detailed description of the latter in an early issue. The members were met at the G. T. P. shops by the superintendent, Mr. F. W. Walker, and Mr. C. J. Maxwell, who is in charge of construction for the railroad.

Annual Banquet, January 25.

This function was one of the most successful of its kind in the history of the Society and reflected great credit upon the entertainment committee of the Manitoba Branch (Mr. W. A. Duff, chairman). In addition to some two hundred members of the Society, those present included the Mayor, Mr. Sanford Evans; Hon. Hugh Sutherland, of the Canadian Northern; Mr. William Whyte, Vice-President of the C.P.R.; Mr. C. C. Chipman, of the Hudson's Bay Company; Hon. J. H. Howden, of the Provincial Government, and many prominently identified with allied professions. Among the latter may be mentioned Mr. D. Atcheson, representing the Architects' Association; Mr. G. A. Bayne, of the Manitoba Land Surveyors, and Mr. F. H. Fay, of the Boston Society of Engineers.

The proceedings from first to last were characterized by a whole-hearted enjoyment always professional in its decorum but enlivened by the college yells so well practised in former days and handed down by the various institutions, such as 'Varsity, McGill and U. N. B., as an indispensable part of their training. "This manifestation of the spirit of the boy is an indication of that of the true man," said Mayor Evans, a little later on in responding to the toast, "Our Guests," proposed by Col. Ruttan. And then His Worship was perforce obliged to pause during the rehearsal of another series of strange staccatos from all corners of the room.

The frontispiece of the menu card contained the following definition:

> "A Banquet is an assemblage of men who look slyly at their watches, wishing they were in bed, while loudly proclaiming they are jolly good fellows who won't go home till morning."

This, however, was evidently the exceptional occasion necessary to establish the general truth of the assertion.

Short speeches, interspersed with musical items provided an ideal programme and there was not a dull moment the wohle evening.

Mr. Sanford Evans, who was received with much enthusiasm, recited at some length Winnipeg's progressive policy in regard to municipal development and dwelt upon the present importance and future prospects of the engineering profession in this connection. In the economical execution of great works involving large expenditures the engineer had a tremendous responsibility. The status of the profession was continually being elevated to a higher plane. The profession had developed rapidly. It was not so very many years since engineering had been a trade, but now it was a profession in the highest and best sense of the word.

The toasts to the Society and to the retiring President and Council were responded to by President Ruttan and Mr. C. H. Rust, respectively. Messrs. Atcheson, Bayne and Fay replied briefly on behalf of "Sister Societies."

At the resumption of the business session on the morning of Thursday, January 26, a special committee was appointed to report upon the most satisfactory principles of construction and maintenance for road and street work, and to draw up specifications for the same. A resolution was proposed in regard to the conduct of the Vancouver City Council in accepting the City Engineer's resignation without giving him a satisfactory investigation, but no definite action was taken beyond the appointment of a committee to investigate the matter and report the following morning. An interesting paper, which we regret is not yet sufficiently complete for publication, was then read by Professor W. Muir Edwards, of the University of Alberta, Edmonton. At the afternoon session there was an excellent gathering to hear the address of the retiring President, Col. Ruttan, and an excellent lantern lecture on the Point du Bois construction by Mr. W. G. Chace, who was accorded a hearty vote of thanks for his comprehensive paper. Col. Ruttan's address will be found in another column.

At the closing session on Friday morning, January 27th, the special committee appointed to inquire into the relations between the Vancouver city council and their engineer, reported that it would be inadvisable to make a resolution such as had been proposed the previous day by Mr. White. The matter was submitted to the vote of the assembly whose verdict was in accordance with the feeling of the committee. While there was a general feeling of disapproval at the action of the council in dealing so summarily with the engineer without giving him an opportunity of being heard, it was realized that the Society had no warrantable ground for interfering between the two parties and that as a general principle it had no locus standi between employer and employee.

A paper entitled, "Hydro-Electric Power Development of the British Columbia Power Company," prepared jointly by Messrs. N. R. Gibson, S. M. Waldron, and A. L. Mudge, had been printed and distributed among the members and at this session Mr. W. H. Munro, of Peterborough, Ont., gave an interesting lantern talk on the work. Some fifty or sixty excellent slides were shown.

The scrutineers reported that the amendments to the various by-laws of the institution had all carried. Among these measures was one in favor of the formation of a new class of junior members, coming between that of student and associate member. Under this enactment the graduate of a recognized enginering school can only remain as a student member one year after graduation.

Election of Officers.

City Engineer Rust, of Toronto, was elected President of the Society for the ensuing year. The remaining officers were elcted as follows: Vice-presidents: Henry Holgate, Montreal; C. E. W. Dodwell, Halifax; Councillors: L. A. Herdt, Montreal; Phelps Johnson, Montreal; H. G. Kelley, Montreal; J. M. Shanly, Montreal; J. G. Sullivan, Montreal; H. H. Vaughan, Montreal; P. S. Archibald, Moncton; F. W. W. Doane, Halifax; R. McColl, Halifax; A. E. Doucet, Quebec; J. T. Morkill, Sherbrooke; P. E. Parent, Quebec; C. R. Coutlee, Ottawa; D. MacPherson, Ottawa; W. J. Stewart, Ottawa; H. E. T. Haultain, Toronto; A. F. Stewart, Toronto; C. L. Fellowes, Toronto; E. E. Brydone-Jack Winnipeg; J. A. Hesketh, Winnipeg; J. G. Legrand, Winnipeg; F. F. Busteed, Vancouver; J. S. Denis, Calgary; J. C. Kennedy, Vancouver.

Votes of thanks were accorded the various bodies that had contributed to the general succss of the meeting. These included the C.P.R.—for their generosity in providing free haulage, the G. T. R., the C. N. R., the Mayor and Aldermen of the City of Winnipeg, the Manitoba Cub, the Canadian Women's Club and the Street Railway Company. Particular appreciation was shown by the members for the work of the Manitoba Branch, whose enterprise and foresight was reflected in the local arrangements. A hearty vote of thanks to Colonel Ruttan for his energetic work in the interests of the Society during the past year practically terminated the session.

The nominating committee appointd in addition to the three last presidents (Col. Ruttan, Mr. Geo. Mountain and Dean Galbraith) was as follows: J. M. R. Fairbairn, Montreal; E. A. Stone, Fredericton, N.B.; E. Decarie, Quebec; Jas. White, Ottawa; A. C. D. Blanchard, Toronto; J. A. Hesketh, Winnipeg; C. E. Cartwright, Vancouver.

The proceedings of the Society closed with a meeting of the newly elected council, at which work of a purely routine order was transacted.

The eastern members left Winnipeg by special train shortly after one o'clock on Friday afternoon. A considerable number of the Winnipeg and other western members put in an appearance and cheered lustily as the train drew out. The Toronto and Montreal members parted company on Saturday night, at Sudbury, after the most enthusiastic demonstration of good fellowship. Professor McLeod was given a particularly warm send-off. The Montreal section was due to arrive at about eleven o'clock on Sunday morning.

The Toronto members reached home about 8.45 a.m. Sunday, January 29, after what was unanimously conceded to be the most delightful combination of business and pleasure ever undertaken.

PRESIDENTIAL ADDRESS OF COL. RUTTAN

Engineering and Conservation.

Engineering was some 80 years ago defined by Thomas Tredgold as "the art of directing the great sources of power in nature for the use and convenience of man."

At the beginning of the twentieth century it has become apparent not only to engineers, but to all those who have the interests of posterity at heart, that the great sources of power in nature should not only be directed, but that they should be economically managed and conserved, so that Tredgold's definition may now properly read, "The art of directing and conserving the great sources of power in nature for the use and convenience of man."

Anything approaching an exhaustive discussion on the subject, one on which volumes might be written, is not now intended. It may be pointed out that among the wastes which have been permitted throughout the past are:

(1) The impoverishment of the lands. The gradual conversion of what were productive areas into barren wastes, examples of which may be seen in older parts of Asia and Europe, and, unfortunately, to an appreciable extent, in North America.

(2) Following the exhaustion of the soil, and keeping pace with it, has been the destruction of the forests; and

(3) The unbalancing, and perhaps the lessening, of precipitation, so that rains come when they are not wanted and fail when they are indespensible for successful agriculture.

(4) The primitive and wasteful manner in which transportation lines are laid and constructed.

It is the last paragraph only with which it is proposed to deal in the present address.

Routes Improperly Located.

The requirements of modern civilization demand not only that people be carried at express speed from one quarter of the globe to another, but that every food and fabric grown and produced be distributed broadcast for the use and convenience of man. The rush to meet these requirements has led to the abnormal development of transportation routes, which, though good in themselves and generally advantageous, have often, with a total disregard of economic arrangement, been improperly located or needlessly multiplied in one section to the inconvenience of another.

The necessary requirements in the initiation and construction of transportation lines may be stated as follows:

(1) A thorough knowledge of the country to be served, both in its physical features and its capabilities for production.

(2) That this knowledge be utilized in the location of lines of transportation, so that the greatest service be provided at a minimum ultimate cost against the traffic using the lines.

Before going further it may be well to consider to what extent these requirements are at present met.

A study of the railway systems of any country must lead to the conclusion that no effective system of supervision has been exercised in the locations of the systems to meet the economic requirements above stated.

Much comparatively useless road has been constructed for the purpose of enabling one set of capitalists to take tolls on traffic which could have been easily handled by an existing line.

Instances appear where productive districts, separated by unproductive or partially unproductive country, are connected by lines running full length through the unproductive land, whereas a single line would have served the traffic of several converging railways. All this largely increases the capital, interest, maintenance, and management charges, which must be borne by the traffic.

Causes of Defective Economy.

Some of the causes contributing to the defective economy referred to are:

(1) Want of knowledge of the country in the construction of the first lines.

(2) The desire of capitalists to share in profits being earned by favorably situated lines.

(3) The ease with which charters for so-called competing lines may be obtained.

(4) The relatively slight interest taken by the public in the location of transportation lines, and the mistaken idea that the construction of any line is advantageous.

This deplorable state of affairs may be remedied in a most simple and inexpensive manner.

Before any companies are given franchises by Parliament, both the public and Parliament should insist upon having before them sufficient information to enable them to judge of the effect upon both public and private property of the proposed works.

Attention is called to the fact that in Canada something should at once be done to arrange for surveys of the country and the preparation of plans similar to the ordnance maps of Great Britain.

A further step forward would be the giving of compulsory running rights over existing lines to companies which may properly participate in the traffic of certain districts, and which cannot do so without heavy expenditure in the construction of parallel lines, which would in themselves be unproductive or which would unnecessarily cut into business which can readily be handled by existing lines.

The remarks on granting charters to railway companies and proposed improvements in procedure apply with equal force to canals, river improvements, and hydro-electric plants.

Though Canada is noted for its magnificent canal system and for the progressive and patriotic policies of its Governments in this respect, the opening up of the country will necessitate in the immediate future a development far beyond any that has yet taken place. It is therefore most necessary that a broad and intelligent view of the whole situation be taken so that duplication of facilities be avoided and expenditure be made in the interest of, and ultimate economy in, capital and operation charges.

Numerous instances might be given illustrating great expenditures which have been made in an ill-considered and extravagant manner in the construction of railways, and of applications to Parliament for charters to construct works, which were both physically and economically impossible to carry out. These have often masked the acquisition by private parties of important assets of the public domain.

Such instances are well known to most engineers. It is therefore not necessary to refer directly to them.

Suggestions Looking to Improvement.

It is not intended in any way to discourage development work in the country, but to point out the haphazard and expensive manner in which undertakings for the public service are often carried out, and to suggest what is considered a business-like and common-sense means of conserving, in this respect, the interest of the people at large. It must be remembered that eventually the burden falls upon, and must be borne by, the people. If the construction of an unnecessary mile of railway is prevented, or a mile already constructed is made to do the work of two, the country as a whole will be greatly benefitted.

At first it may appear that the suggested changes in initiating and carrying out public works would, if carried into effect, discourage the construction of works needed for the development of the country and its resources. This, however, would not be the case; on the contrary, the care displayed in scrutinizing projects before they were authorized would give confidence to investors by the assurance that, in the opinion of Parliament, the works were such as were reasonable and proper, and would go far, by the confidence inspired, to facilitate the flow of capital into the country.

A charter granted by Parliament under the regulations proposed would be in itself a guarantee that the project was sound and practicable. The criticism called for by these regulations should greatly assist in determining the merits of such projects.

It is, of course, apparent that ,in addition to the enormous saving which could be made by the economic location and construction of works for the use and convenience of the public, there are other conditions not less important. For example, the power now possessed by companies to increase capital beyond reasonable limits, and the crude management in operation, now being so much discussed in connection with the claim of the American railways, that rates must be increased to enable them to earn revenue to meet their capital and operation expenses.

In the following conditions the last two are not purely engineering, and need not be further considered at the present time: (1) The economic location and construction of lines of transportation, (2) the limiting of capitalization within reasonable bounds, (3) the scientific and economical operation of all transportation services, will all three have the effect of reducing rates to a minimum.

It is in the first of these that engineers are vitally interested, and their advice to clients will go a long way towards conserving immense sums of capital now wasted in crude and uneconomical locations and constructions. The word economy has no reference to detail, and is used in its broader meaning only. As to economy of designs in detail, there is no fault to be found; on the contrary, all are proud of the bridges, tunnels, and other noted structures which are being constantly turned out by the profession.

In carrying out the proposed system no cumbersome legislative machinery would be required—an amendment to the Railway Act giving the Railway Commission power to make regulations for the necessary surveys and plans, and finally to deal with the matters in question, is all that would be necessary.

Mayor Taylor, of Vancouver, resents the attitude of the Canadan Society of Civil Engineers in discussing the relations between the City Council of Vancouver and City Engineer Clement. Interviewed recently, Mr. Taylor stated that there had been no direct proposal to discharge the City Engineer. At present the city had under consideration the appointment of a supervising engineer. There had been no need for investigation as no charge of incompetency had been made, neither was any personal question involved. Mr. Taylor concluded by stating that Vancouver's engineering department would in any case be reorganized.

A meeting of the representatives of the various municipalities on the Island of Montreal is being called by Mayor Guerin to discuss the practicability of adopting the borough system as used in London, Eng.

Recent Investigations on Sewage Disposal

An Interesting Report on the Question with Reference to the Pollution of Lakes and Streams in Canada -- Data from Many Cities

The rivers and streams of a country are the natural drainage channels into which all of the rainfall, not directly evaporated or taken up by plant growth, must ultimately find its way. A portion of it sinks into the ground and reaches the streams in the generally pure form of springs or seepage through their beds or banks. The remainder flows directly into them over the surface, and naturally and inevitably carries with it a considerable quantity of polluting matter, the character of which will depend upon the nature of the drainage area and density of the population.

The surface drainage from an uninhabited watershed will not generally cause any dangerous pollution, but may add to the color and turbidity of the water to an extent as to make it more or less objectionable for domestic purposes. Streams, however, rising in mountainous or other wild unsettled districts usually furnish good and wholesome water near the source of their supply; but where they pass through populated districts, devoted to farming and other industries, they receive from their banks, and from tributary brooks and rivulets, the drainage from farm yard, dairies, dwellings, manured land, and finally the sewage of villages and towns. Much of the objectionable drainage from country districts is more or less purified by natural processes, but on the other hand a considerable proportion often reaches the stream direct. That this is often highly dangerous in character has been demonstrated in several instances, as at Lowell, Mass. This city, which obtains its water supply from the Merrimac River, was visited in the autumn of 1890 by an unusually severe epidemic of typhoid fever. By careful investigation this was traced to an infection of the river water by a few cases of typhoid fever on a small brook which entered it about three miles above the water works intake.

It is impossible, or at least impracticable, to prevent pollution of this kind except in the case of streams with very limited watersheds, where the conditions may be made subject to control. In this connection it is interesting to note the case of Liverpool, England. The water supply is obtained from a stream rising in the mountains of Wales, the watershed of which is owned or controlled by the city. This circumstance is not, however, depended upon to ensure the entire safety of the water, which is filtered through slow sand filters before being delivered to the consumers.

So far as the subject of this report is concerned, the pollution of lakes and streams referred to applies particularly to that produced by large isolated institutions, industrial establishments, etc., or by cities and towns provided with systems of sewers and drains. It, therefore, does not deal with all sources of pollution, but rather is confined to those cases in which impurities are added, in comparatively large quantities, to water which is already more or less impure. It is important that this should be borne in mind when considering the general question of sewage disposal, and the degree of purification which may be deemed practicable or indispensable.

The necessity for the purification of sewage may be considered from two points of view, with regard to the organic matter which it contains, and, second, with regard to its germ content. The inevitable fate of the organic matter is to pass through certain processes of decomposition where natural conditions, this may cause nuisances and conditions offensive to the senses. The main object of sewage dis- by it is ultimately reduced to harmless mineral forms. Under posal, as it is at present understood and practiced, is to cause this decomposition to take place quickly under controlling circumstances, and at least to such a degree as will prevent it from undergoing further putrefactive changes. All modern methods of treatment are capable of accomplishing this, but without greatly diminishing the number of bacteria present in the raw sewage, where they often occur to the extent of several millions per cubic centimeter. Among them are to be found large numbers of germs from the intestines of man and the lower animals, and these usually include specific germs of disease.

Sewerage Systems

Sewerage systems may be either combined or separate, that is, there may be a single system to carry both the domestic sewage and the street drainage; or the domestic sewage and the street drainage may be kept separate and carried by a system of sanitary sewers and a set of storm water drains. During heavy storms combined sewers will occasionally have to discharge a volume many times greater than the dry weather flow. It is obviously impracticable to attempt to purify more than a small percentage of the storm water discharge. The English Local Government Board requires sewage disposal plants for systems of this kind to have a capacity necessary to provide for six times the dry weather flow. Anything beyond this is discharged without treatment. It is therefore evident that the kind of sewerage system in use, whether separate or combined, will have an important bearing on the question of the disposal or treatment of the sewage, and the pollution of the bodies of water into which it is finally discharged.

Detailed descriptions of the principles of sewage purification, and the different methods by which it may be accomplished, are given in the various published works on that subject. It will be convenient, however, at this point to refer briefly to these methods and to mention a few sewage disposal plants now in operation which illustrate the different processes.

Early Methods of Sewage Disposal

With the introduction of really efficient systems of sewerage which has taken place almost entirely within the last fifty years, the first and most obvious method of disposal was to turn the sewage into the nearest body of water. Incidentally, it may be stated that this is still the practice in the majority of cases in every country with the exception of England. There, the density of the population, the great number of large manufacturing cities, and the small size of the rivers, combined to produce conditions which urgently demanded some measures of relief. The first method employed was Broad Irrigation, or Sewage Farming. The results obtained were in many cases fairly satisfactory, but the difficulty in obtaining the required areas of suitable land, and certain objections from a sanitary standpoint have led to a gradual restriction in their use, and even to their abandonment in Birmingham and several other places.

Many other systems involving chemical treatment of the sewage were attempted, but generally with indifferent success in the way of real purification. The example of England was followed to some extent in other parts of Europe and in the United States. In the latter country intermittent

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Extract from Report of Committee on Sewage Disposal. Presented at Annual Convention of the Canadian Society of Civil Engineers.

filtration through prepared beds of underdrained sand anr gravel has been used with great success in some of the Eastern States where the natural conditions are favorable. Generally, however, there has been little development until within the last twelve or fifteen years. During this period the newer methods of sewage disposal, or the so-called "biological processes," have been more fully studied and developed, and are now being almost universally adopted.

Modern Methods of Sewage Disposal

These may be said to consist in a general way of two processes, viz.: (1) the separation of the greater part of the suspended matter or sludge, and (2) the oxidation of the remainder and of the organic matter in solution, in artificially prepared beds or filters. The first, or sedimentation process, is accomplished by screening the sewage and passing it through sedimentation, chemical precipitation, and septic tanks, and the deep tanks of the Hampton and Imhoff types.

In the second or oxidation process, there are two general methods employed, viz.: Contact Beds or Percolating Beds. These beds are commonly called filters, though the process is not one of filtration.

Contact Beds are briefly watertight basins, 4 or 5 feet in depth, filled with crushed clinker, coke, coal, broken stone, screened gravel, or any hard substance, broken to the proper size, which is usually from ¼-in. to 1½-in. The tank effluent is applied to the beds by means of overflowing grooves and troughs and through open jointed pipes. When the bed is filled to within a few inches of the surface, the inflow is stopped and the bed is held full for two or three hours. Next, the effluent valves are opened, allowing the beds to empty slowly and the interstices to fill with air. The beds are then allowed to remain empty for a time, when the entire process is repeated. The time of a complete cycle thus includes the periods of filling, resting full, emptying, and resting empty. Ordinarily, there are three such cycles in twenty-four hours. The beds are usually operated in groups, and the valves are opened and closed at the proper times by automatic devices. In many cases it is necessary to pass the effluent from the first contact beds through a second set.

Percolating Beds are sometimes referred to as Trickling or Sprinkling Beds or Filters. In this instance the materials used are the same as in contact beds, but usually of larger size. The walls need not be watertight, their purpose being merely to support the material of the bed. They are usually from 6 ft. to 8 ft. deep. The sewage is distributed over the surface of the beds in the form of a spray from jets placed at regular intervals, or from travelling distributors usually operated by power. The operation is continuous, the sewage trickling through the material of the bed and carrying the air down with it. The concrete floor of the bed is provided with a system of underdrains through which the effluent discharges.

Efficiency of the Different Processes.

The degree of purification effected by the different methods referred to may be briefly stated as follows:

Sewage Farming.—Where sufficient areas of well drained suitable soil are available, the effluents are usually nonputrescent and often of a comparatively high degree of purity. The percentage reduction of bacteria is also satisfactory both with respect to the total number and to Bacillus Coli, which is a representative intestinal germ. In many cases, however, where there is careless management, over dosing, and non-porous subsoil, the purification is inferior and the effluent contains large numbers of bacteria.

Intermittent Filtration.—Under favorable conditions this is the most efficient of all processes, the effluents being uniformly non-putrescent and the bacterial contents comparatively low, usually less than 10,000 per c.c. These results are not, however, always attained in practice, especially during the winter and early spring.

Contact Beds.—Treatment by single contact effects a moderate degree of purification, but a second treatment is generally necessary to secure a non-putrescible effluent. The removal of bacteria is imperfect, the effluent frequently containing a million or more per cubic centimeter.

Percolating Filters.—The purification effected by this process is superior to that obtained by double contact. The effluent is ordinarily non-putrescent, but at intervals it contains an unusually large proportion of suspended matter. When the removal of this is necessary it can be readily provided for by small sedimentation basins. The percentage reduction in bacteria is higher than with contact beds, but is still so low as to be of little importance from a sanitary standpoint.

From the experience of the last few years with contact beds and percolating filters on a working scale, and from the results of several series of experiments carried out in the United States, Germany, France, and England, the concensus of opinion seems to be in favor of the percolating filter, and this is the process which is now being adopted in the majority of cases in the United States and Europe. Manifestly the operation of either system during the winter season in cold climates will be attended with special difficulties. Two contact bed installations, one for the sewage of Macdonald College at Ste. Anne de Bellevue, and the other for a small district in Toronto, are reported to be working satisfactorily; and at least two percolating filters are being built in connection with institutions in Quebec.

In the colder parts of Canada no demonstration has yet been made of their possibilities, though several plants are contemplated, or are already in course of construction in Saskatchewan and Alberta.

Dunbar, a German authority on sewage disposal, states that "the object of sewage disposal may be briefly described as an attempt to preserve our rivers in a natural condition, to guard them against visible pollution, and to prevent danger to the health of those living near them."

These requirements can be fulfilled under all circumstances by methods described above. To what degree purification should be carried out, or whether it is necessary at all, will depend on local circumstances, each case requiring separate consideration. In large rivers such as the Ottawa and St. Lawrence, the raw sewage of even large cities can be discharged without sensibly offensive results. The dilution is so great that the organic matter soon disappears under the action of natural processes of purification. The same is, in general, true of large lakes, where the sewage is discharged a sufficient distance from the shore. Where, however, the stream or lake is small and the volume of sewage discharged is relatively large, one or other of the complete processes must be employed, which will produce a non-putrescible effluent. In England, where the conditions are most unfavorable, this is practically the universal requirement; and the same may be said of Germany, France, and the United States.

When the water of a river or lake is to be used for domestic purposes, the aspect of the case is entirely changed. The presence of intestinal bacteria, which cause typhoid and other diseases, undoubtedly constitutes a menace to health; and while their tendency is to die, and eventually disappear, they may persist in sufficient numbers to render the water dangerous for drinking purposes for long distances from the point of discharge. Modern sewage disposal methods do not prevent such contamination. Unavoidable pollution of the same nature from combined sewerage systems, and from country districts, has already been discussed. Hence the only feasible method of securing complete protection for surface water supplies would seem to be the filtration of the water by the towns and cities using it. In Germany this is required by law for all surface supplies.

There may, however, be special circumstances such as the close proximity of a sewage outfall to a waterworks intake, which would render the filtration of the water unusually difficult or expensive; or where, as in the case of Baltimore, a shellfish industry is threatened. In such cases further treatment for the purpose of disinfecting the effluent, or the removal of the bacteria, should, if possible, be employed. The latter can be accomplished to a greate extent by filtration through sand. Disinfection of effluents and even of raw sewage, by various chemicals, has been practiced in emergencies for some time, but the high cost of the materials, and the large quantities employed, render it generally prohibitive on the score of expense. But within the last four or five years, experiments by Rideal, in England, and Phelps and others in the United States, have shown that filter effluents can be sterilized to the extent of destroying practically all the harmful bacteria by the use of chloride of lime or bleaching powder, and at an estimated cost of from $1.50 to $3.00 per million gallons of sewage. Tank effluents and even raw sewage can also be sterilized but at a considerably greater cost. Plants of this kind are contemplated for several places in the Atlantic States where the circumstances warrant their necessity. It should be observed in this connection that chloride of lime has lately been successfully used for the disinfection of water supplies, and at a mere fraction of the cost of treating sewage.

Conditions in Canada

Coming now from the foregoing general survey of the subject to consider more particularly the conditions in Canada, we find that with its large lakes and rivers, and its relatively small population, it has so far suffered less from inadequate methods of sewage disposal than most countries. For the purpose of obtaining definite information, a list of questions was sent to all places with populations of 1,000 or over.

Questions Asked.

1. Is the sewerage system of your city separate or combined (i.e., do the sewers carry domestic sewage only, or do they also provide for street drainage and storm water in the same pipe)?
2. Do your sewers discharge directly into a lake or stream? If so, please give the names.
3. Is the sewage treated or purified in any way? If so, please describe method, giving information as to whether it has been successful and whether any difficulties have been met with in operating it, especially referring to winter troubles.
4. What tests have been made to determine the character of the treated sewage? Please give the results of any such tests.
5. Where is the water supply obtained from? If from a river or lake, please give the name.
6. If water supply is obtained from a stream, is there any considerable discharge of sewage or factory refuse above, or if obtained from a lake, is there any considerable discharge near the point where the supply is obtained?
7. Is the water supply filtered or otherwise purified, and if so, by what means, and are the results satisfactory? Has any analysis of the water been made? If so, give results.

The replies may be briefly summarized where necessary as follows:

Question 1. 64 places report combined systems, 38 separate, and 64 none at all.

Question 2. Of those reporting from the Maritime Provinces, the discharge in every case but one is into the sea coast harbors or tidal estuaries unfit for domestic water supplies.

Quebec reports 8 discharging into the fresh water portions of the St. Lawrence or into the Ottawa, and 13 into smaller rivers.

Ontario reports 20 discharging into the St. Lawrence, or into the Ottawa River, or into the Great Lakes, and 30 into smaller rivers and lakes.

Manitoba reports 5 discharging into the Red and Assiniboine Rivers.

In Saskatchewan, 2 discharge into the Saskatchewan River and 2 into small creeks.

In Alberta, 3 discharge into the Saskatchewan, 5 into smaller rivers.

Question 3. The Maritime Provinces, Quebec, and Manitoba, report no sewage disposal plants.

British Columbia reports 1 place with tank treatment.

In Ontario there are 15 reported, 9 with tank treatment only, 4 with tanks and bacteria beds, 1 intermittent sand filter, and 1 with treatment on land.

Saskatchewan and Alberta each report 1 place with septic tanks and a few others in which the newer processes are contemplated at an early date or are actually under construction.

That is, only 18 places report any kind of purification, and in 12 of these it is limited to treatment in tanks.

Questions 5, 6 and 7. Of the 166 places reporting, 145 have waterworks. Of these, 36 have supplies from underground sources, 44 obtain their supplies from small lakes and streams in practically uninhabited watersheds, 25 from the Great Lakes and the St. Lawrence and Ottawa Rivers, and 40 from lakes and streams liable to some contamination by sewage.

14 places report mechanical filters for the water supply, 1 place a slow sand filter, and 9 natural filtration through river beds. In Toronto and Montreal the water is treated with hypochlorite.

The information furnished by these replies shows that not much has yet been done in Canada, in the way of the purification of either water or sewage. At the same time, it indicates that favorable local circumstances in many cases have so far prevented any serious consequences. Nowhere in Canada do such adverse conditions exist as are frequently met with in other countries, as for example, on the Hudson, Merrimac, Passiac, Susquehanna, and other rivers in the United States. These facts do not detract from the importance of the subject of this report, but rather to emphasize the necessity of taking prompt and effective measures to put an end where possible to any present pollution of the lakes and streams and to prevent it in the future.

In the Maritime Provinces the sewage is in most cases discharged into sea water unfit for domestic supplies, and where the dilution is sufficient to prevent nuisances. In such cases there is no immediate need of sewage purification.

In Quebec and Ontario, many of the towns discharge their sewage into, and obtain their water supplies from, the Ottawa and St. Lawrence Rivers or the Great Lakes. While the dilution is great, the water is, in important cases, unsafe for drinking without previous purification, and sometimes the effect of eddies results in the contamination of the water supply by the sewage of the same place. In such places, at least, thorough purification of the sewage as well as filtration of the water may be necessary.

The need of both water filtration and sewage purification will obviously be greater in the interior sections of these provinces, where the only available source of water supply may be from the smaller lakes and rivers tributary to the St. Lawrence and Ottawa Rivers and the Great Lakes.

In the Northwest Provinces the water supply problem is an unusually difficult one, as it must in many cases be obtained from the rivers which receive more or less directly the discharge from all sewerage systems.

In British Columbia the conditions on the coast are similar to those in the Maritime Provinces. Up to the present time the water supplies have been obtained from mountain streams or lakes whose water sheds can be protected. The necessity for sewage purification is therefore far less urgent than in the interior provinces.

Legal

Before submitting our conclusions and recommendations with respect to the subject of this report, it is desirable that some idea should be given of the legislation dealing with this question of sewage disposal, which, after considerable experience, it has been found exepdient to adopt in older countries.

In England, the Public Health Act of 1875, and the Rivers Pollution Act of 1876, and subsequent amendments depute to the Local Government Board the supervision of sewage disposal. The 1875 Act requires the sanction of the Board for the raising of loans for the purpose, and gives the Board power to require land treatment in all cases. The 1876 Act prohibits the throwing of any solid or liquid sewage into the streams and the pollution of the streams by sewage and manufacturing refuse, but certain qualifications have rendered these laws more or less ineffective. Such Acts as the Mersey and Irwell Act, and the West Riding of Yorkshire Act, have since been passed, which provide for the formation of joint Committees for the purpose of administrating the Rivers Pollution Prevention Act. These committees are given special powers against the pollution of streams by solid matter and domestic and manufacturing sewage, but in the latter case proceedings can only be taken with the sanction of the Local Government Board.

France

In France, plans for sewage disposal after being submitted to the engineers in charge of the body of water into which the effluent is to be discharged (navigable rivers, non-navigable rivers, or the sea), must then be approved by the Department Board of Health if the population of the town is less than 5,000; or to the Conseil d'Hygiene Superieur if it is 5,000 or more.

Germany

In Germany the various Federal States each have their own laws relating to river pollution. As most of the German rivers flow through several states, attempts have frequently been made to obtain Imperial legislation, but the constitution renders this impossible. It, however, places the supervision and legislation concerning measures to be adopted by the Medical and Veterinary Police authorities in the hands of the Imperial Government and hence the Epidemic Diseases Act of June 30th, 1910, stipulates that methods for the disposal of waste shall be supervised by the State. Provision is also made for the formation of an Imperial Couneil of Health, the work of which, so far as river pollution is concerned, is restricted to those waters which flow by several of the Federal States.

Summary of Conclusions

After a consideration of the various phases of the subject of this report our conclusions may be summarized as follows:

1. None of the methods of sewage disposal, which are feasible and economically applicable on a large scale, are capable of effecting complete purification. Effluents can, however, be produced which are non-putrescible, and which may be discharged into bodies of water without any danger of causing nuisances, or of sensibly impairing the quality of the water, as determined by chemical analysis. The percentage removal of bacteria is often high, but this cannot be depended upon, and even under the best conditions the actual number remaining in the effluent is still very considerable.

2. The distinction between the general surface drainage of a populated district and its urban sewage is one of degree only, and each in itself may render the water into which it discharges, unwholesome, and dangerous for drinking purposes.

3. Since much of the surface drainage cannot be even collected for treatment, and since sewage disposal processes in the present state of the art cannot be depended upon to effect complete bacterial purification, it follows that the raw water of rivers and lakes in populated districts can never be considered entirely safe, and fit for domestic supplies.

4. Experience has shown that water of even a considerable degree of pollution can be rendered pure and wholesome by filtration, and, for practical purposes this is the only reliable means of ensuring the safety of surface supplies from unprotected watersheds.

Towns and cities which take their supplies from suspicious sources should not depend for their safety upon the efforts of others, but should themselves adopt such precautions as are available. To require the purification of the sewage of a large city, in order to afford protection to the water supplies of one or two small places down stream, which could be more effectively accomplished at a much lower cost by filtration, would be at least an unbusinesslike procedure. As a matter of fact each case constitutes a separate problem in itself, and whether sewage purification or water filtration is demanded, or whether both are necessary, are questions which should be dealt with by properly qualified experts.

5. In Canada up to the present time practically nothing has been done in the way of purifying the sewage of municipalities, except in the case of less than half a dozen places in the Province of Ontario. During the last two or three years, however, the importance of the subject has been gaining general recognition. While the climatic conditions are in some parts of the country unusually severe, there is little doubt that the methods which have proved effective in other countries can be employed sucessfully here, though special provision will be necessary to ensure efficient operation during cold weather.

6. The Public Health Acts of the different Provinces provide in a general way against the discharge into bodies of water of matters which would cause nuisances, or which would endanger the public health. Such laws lack definiteness, and are therefore generally ineffective. A consideration of the legislation on the subject of sewage disposal and stream pollution, indicates that the best laws are those which, instead of attempting to formulate specific rules or regulations which can never have more than local application, require all plans for proposed works to be submitted for approval to the Provincial Boards of Health, or other properly constituted bodies. These should have the power to enforce their recommendations with regard to both sewage disposal and the filtration of water supplies. Such power is very effectively secured by Section 23 of the Saskatchewan Act.

Interprovincial and International rivers should be subject to joint Federal and Provincial control, and it is desirable that all legislation on the subject should be as nearly uniform as possible.

Committee

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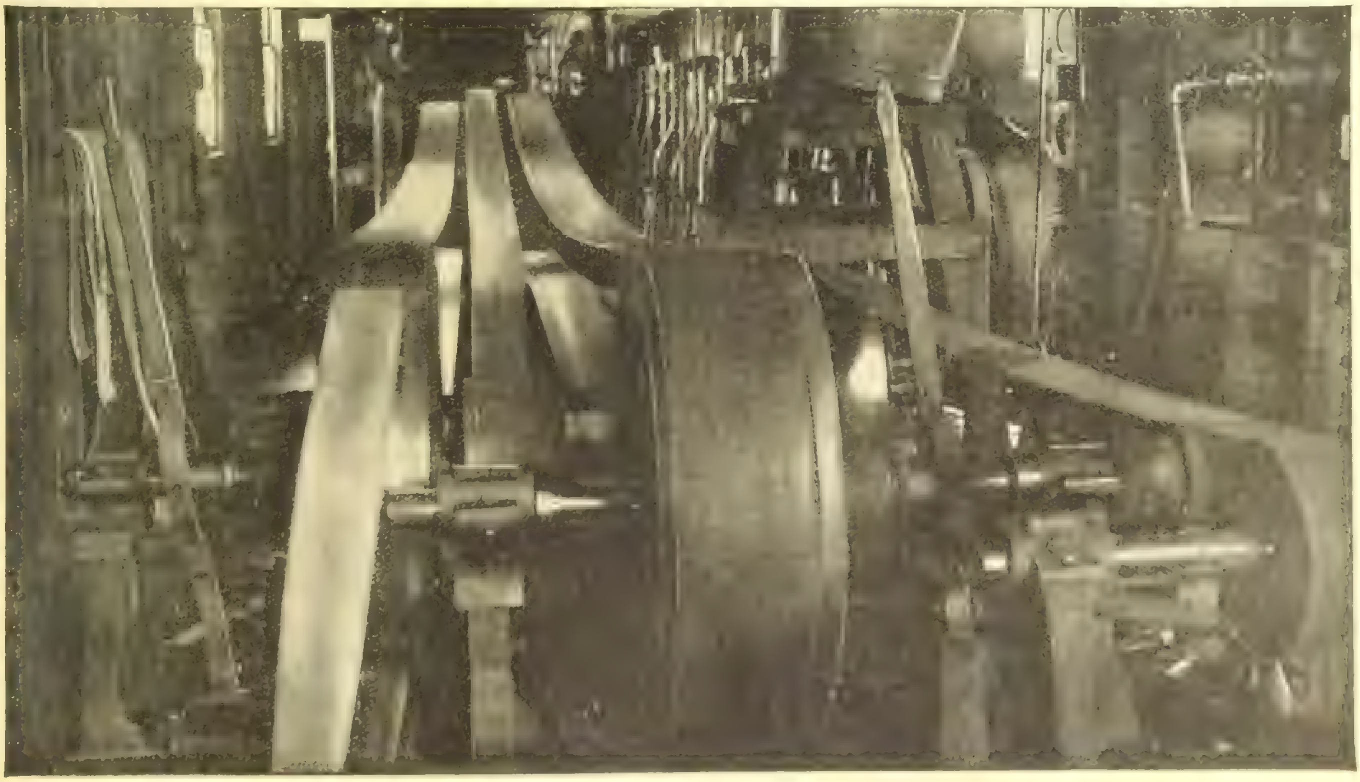

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A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

A Strong New Machinery Company

One of the largest selling companies recently organized in Canada is The Hamilton Machinery Company, Limited, of Hamilton, Ont., incorporated under a Dominion charter. The officers are: George T. Webb, president; F. W Woods, vice-president and general manager; R. F. Mancill, secretary-treasurer. This company will handle the entire output of The American Road Machinery Co., Goderich, Ont., consisting of rock crushing plants, road machines, street sprinklers, street sweepers, and everything for the road builder.

They have secured the exclusive right in Canada for selling improved corrugated steel pipe for sewers and culverts, made by the Keystone Smooth Bottom Corrugated Steel Sewer Pipe Company. These culverts have been very largely used in municipal and railway work throughout the United States.

In addition to having the exclusive agency for the "Interstate" automobiles manufactured by the Interstate Automobile Company, of Muncil, Indiana, the company are now arranging for the Canadian agency for two leading lines of motor trucks.

They will also handle a complete line of concrete machinery manufactured by the London Concrete Machinery Co., Ltd., London, Ont., as well as "Champion" wire fence and wire for reinforcing concrete.

It is the intention of the company to carry a complete line of contractors' machinery and mining machinery of all descriptions, and they purpose to make their selling organization one of the most complete in the Dominion of Canada.

A magnificent suite of executive offices, and spacious show rooms are being fitted up by the management at 144 Yord street, Hamilton. They will also have branch offices at Vancouver, Calgary, Winnipeg, Cobalt, Toronto, Ottawa, Montreal, Quebec, Fredericton, N.B., St. John, N.B., and Truro, N.S.

Dredge of Latest Design

There will arrive at Vancouver about the first of February, the new Government dredge No. 508, which left Scotland on November 7th for its long journey round the Horn. The dredge, which was built by Messrs. William Simons & Co., Ltd., Renfrew, Scotland, is of the bow well bucket ladder type. It is of steel construction, 199 feet long, 36 ft. 6 in. broad and 13 ft. 6 in. deep, and is designed for dredging 1,000 tons of free material per hour. The driving gear and bucket chain is designed for dredging hard ground; the buckets are 24 cubic feet capacity with solid cast steel backs and links; the cutting lips and all wearing surfaces being of manganese steel. The gearing for driving the chain, which is of cast steel, is arranged to give two speeds which are suitable for the material to be dredged.

The bucket ladder is suspended on an independent shaft, works in an open bow well and is capable of cutting the dredge's flotation and dredging to a depth of 50 feet. Shoots are provided on each side of the vessel to deliver the spoil as required, and are worked by independent steam gear. All the necessary mooring and warping winches are of the most powerful design for dredging in rapid currents. Scotch boilers working at 120 lbs. and two sets of compound surface condensing engines constitute the motive force, the speed on trial trips under deep load conditions being ten knots. The engines are arranged to drive direct on the screw shafting, or to operate the dredging machinery.

The Advance Machine Works, Limited, Walkerville, Ont., furnished an alternating current three-motor electric crane for the Roman Stone Company's plant at Weston, Ont.

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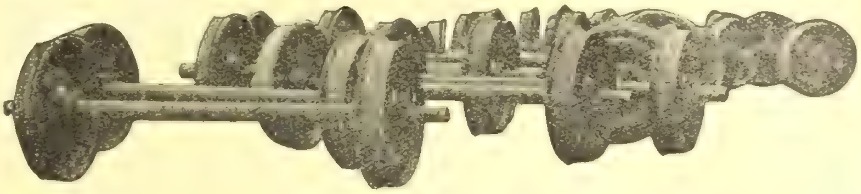

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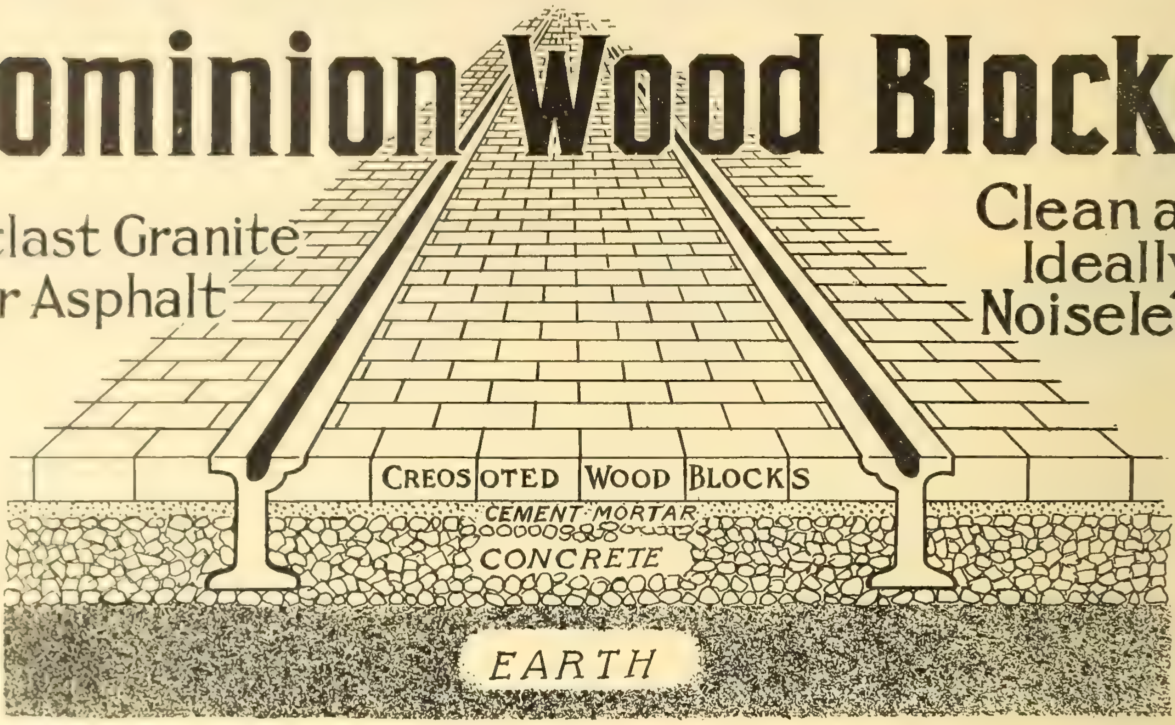

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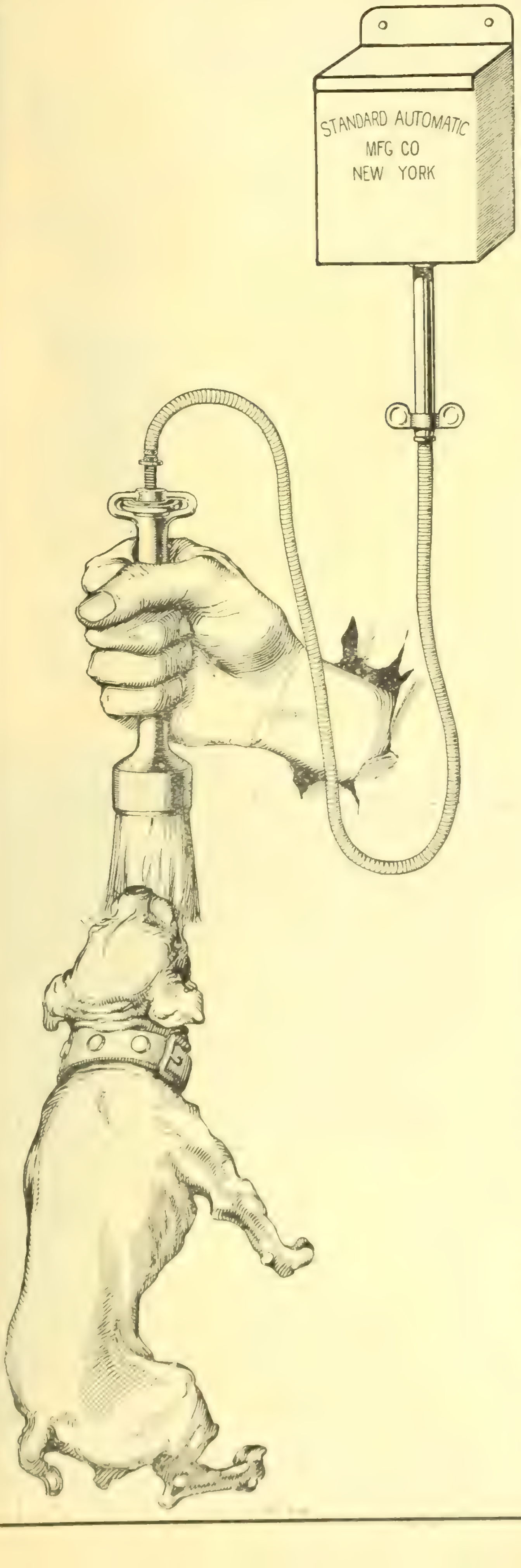

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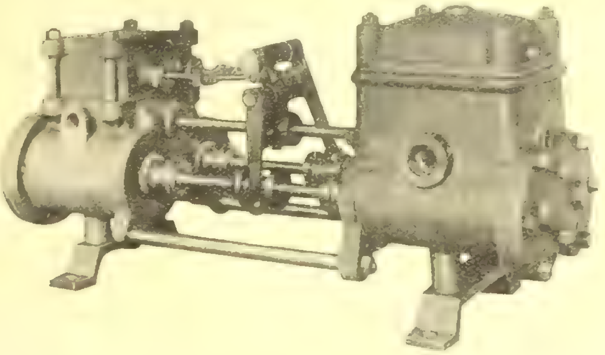

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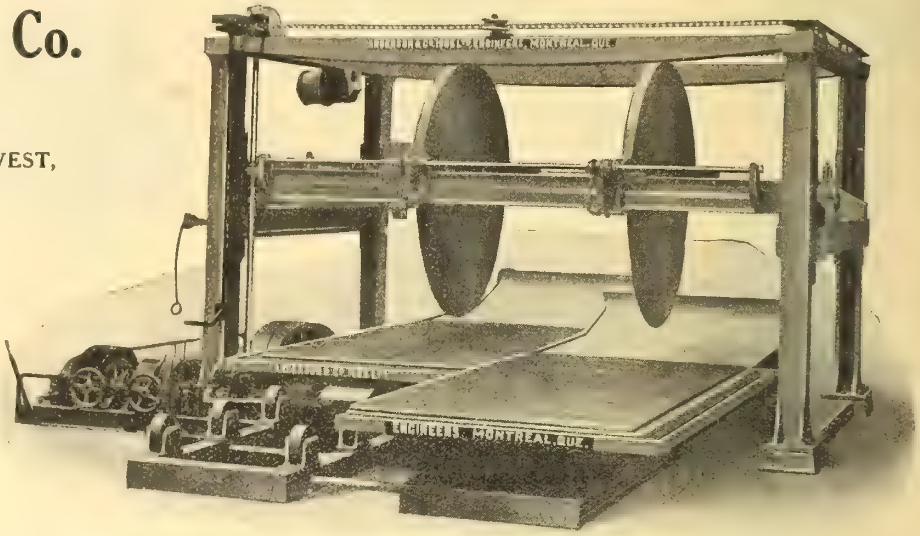

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[illegible]	United States Government	[illegible]	[illegible]
17	Cemeteries, Vaults, Tombs and Greenhouses	[illegible]	[illegible]
111	Athletic Clubs, Clubs, Universities, Colleges and School Buildings	[illegible]	[illegible]
[illegible]	Hotels, Apartments, Restaurants and Supply Stores, Markets and Refrigerating Plants	[illegible]	[illegible]
70	Pumping Stations and Power Houses	1,779,271	935,622
[illegible]	Natatorium Swimming Pools and Comfort Stations	[illegible]	[illegible]
11	Hospitals, Asylums, Homes	1,062,571	110,400
[illegible]	Private Stables	[illegible]	[illegible]
[illegible]	Railroad Stations and Subways	[illegible]	[illegible]
[illegible]	Mills and Factories	[illegible]	[illegible]
17	Police Stations and Fire Houses	208,664	28,837
[illegible]	Total 1st	[illegible]	[illegible]
	Total 2nd	4,660,766	
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The following are wholesale prices delivered t Toronto:—

	Per B.
o. 1 dry pressed red brick	$18.00
o. 1 dry pressed buff brick	18.00
ed Stock Bricks	12.00
rey Stock Bricks	11.00
Wire cut bricks for foundation work....	11.0
'orous terra cotta bricks	15.00
fo. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Iamilton and London. These prices are f.o.b., vith 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
0 to 25 united inches......	$4.25	$ 6.25
6 to 40 "	4.65	6.75
1 to 50 "	5.10	7.50
1 to 60 "	5.35	8.50
1 to 70 "	5.75	9.75
1 to 80 "	6.25	11.00
1 to 85 "	7.00	12.50
6 to 90 "	...	15.00
1 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
01 to 105 "	...	24.00
06 to 110 "	...	27.50

The following are wholesale prices for glass t Montreal and jobbing prices at Winnipeg for ·ox lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
00 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, ·2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 0 per cent. off. Winnipeg prices are net.

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'loor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

'loor Tile—½-inch square, 65 cents.

Vall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

Vitreous Tile—All sizes, according to color, 55 to 65 cents.

Hazed—White, 6 x 3 inches, 55 cents per square foot.

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)palite Tile—3-16 inch No. 1 standard, size 6 x 3 inches, 6 x 2 inches, 60 cents.

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Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 70 per cent.; roundway, 65 per cent.

No. 4 compression bath cock ....net	$1.65
No. 4½ Fuller's ....net	2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks.

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe.

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings.

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 per cent.; fittings, 70 and 10 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale lots of 1,000 barrels f.o.b. Toronto, bags extra, $1.65.

Cement, car lots, f.o.b. Toronto, bags extra, $1.70

Crushed stone, $1.25 per ton, f.o.b. Toronto.

Binder stone, $1 25 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $14 to $15 per toise.

Free stone delivered, 14 to $15 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Brown sills and beads, in the rough, delivered, 35 cents per foot.

Rubble stone in car lots, $1.25 to $1.30 per ton

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.60 per 100 pounds, delivered f.o.b. Toronto.

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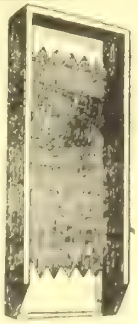
Plaster of Paris, per barrel, delivered, $2.20.

Manilla Rope, best, per pound, 15 cents.



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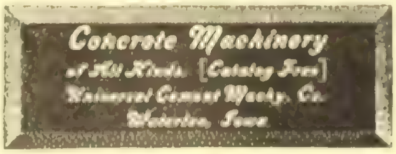

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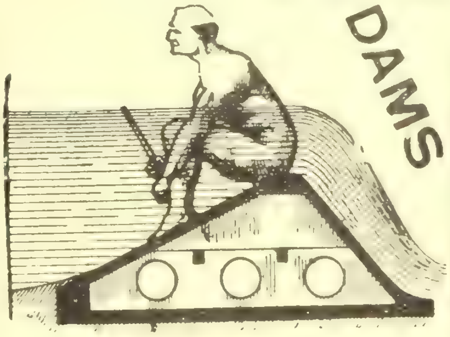

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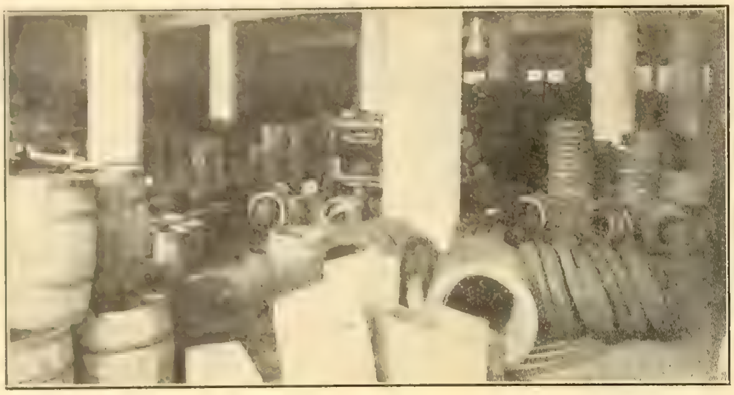

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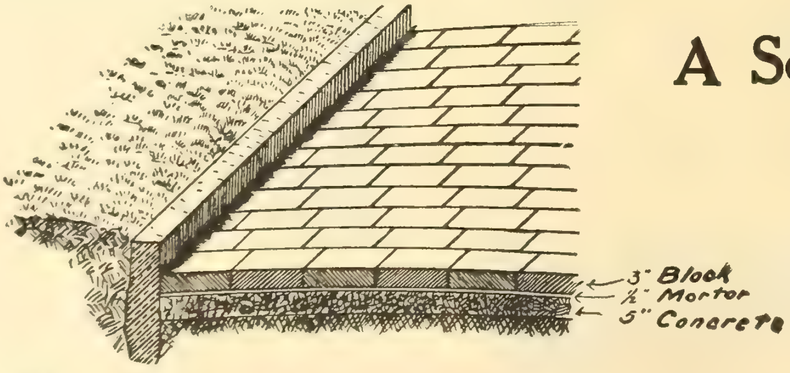

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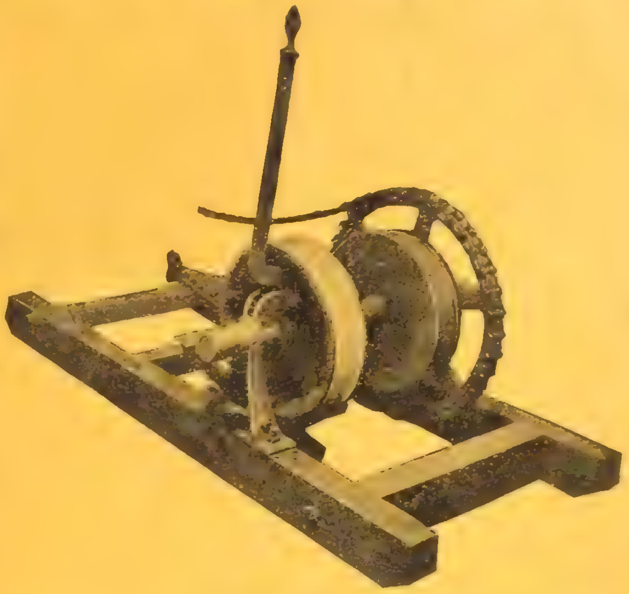

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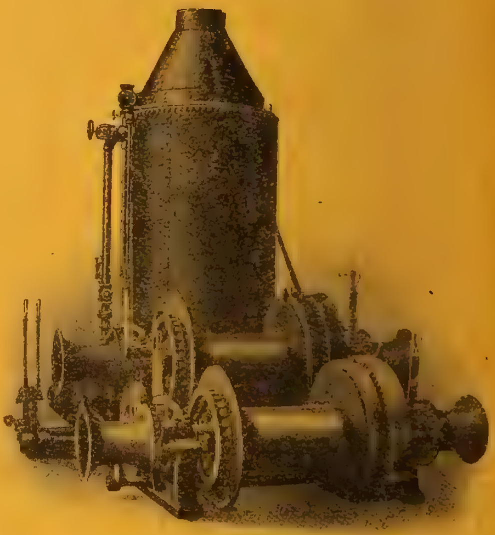

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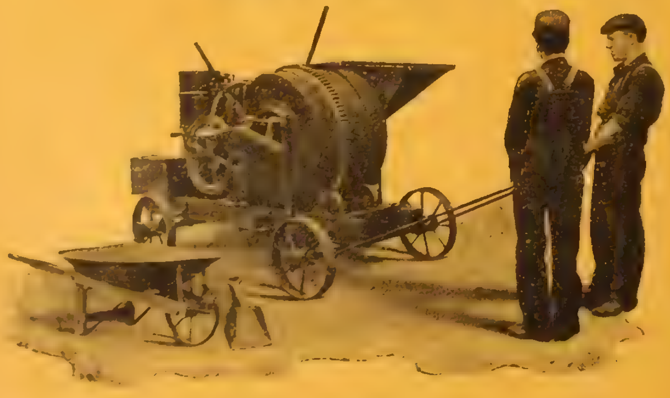

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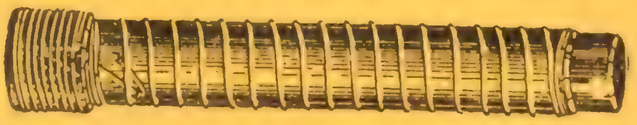

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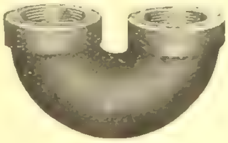
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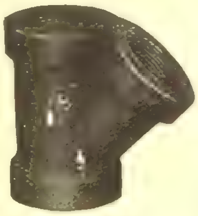
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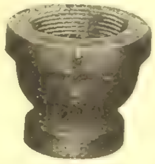
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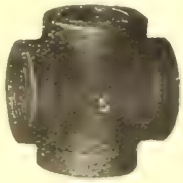
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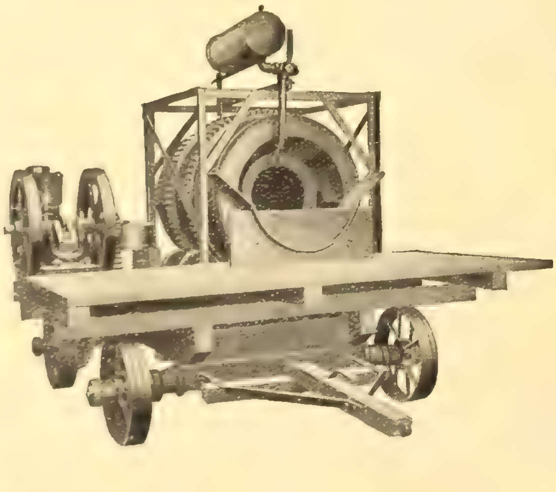

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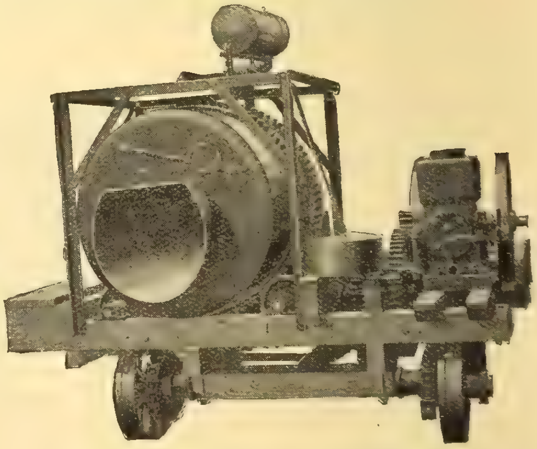

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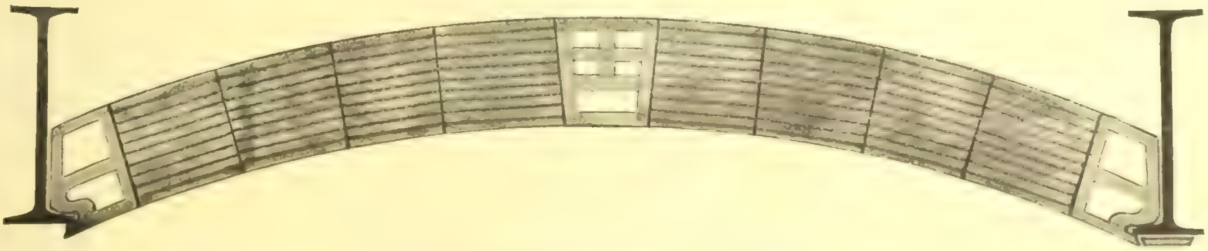

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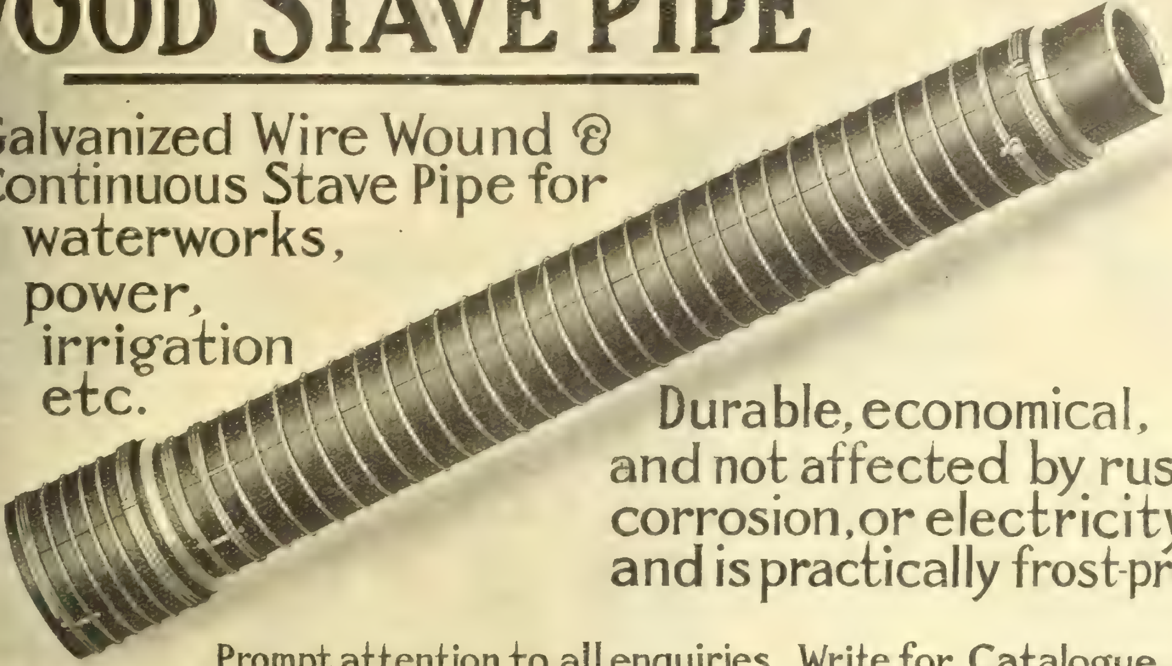

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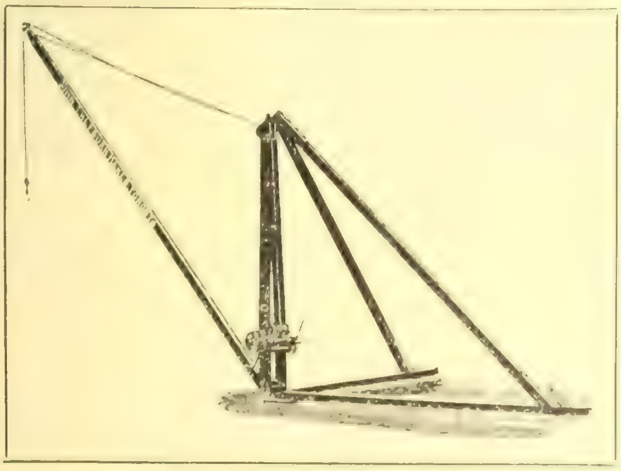

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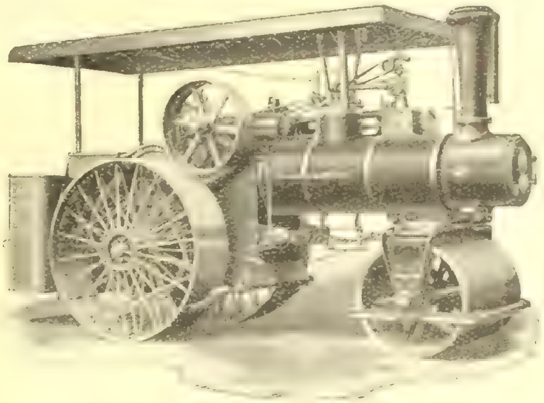

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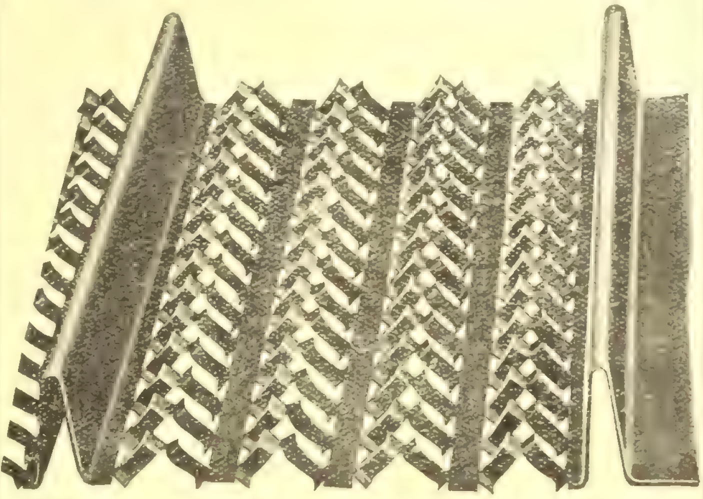

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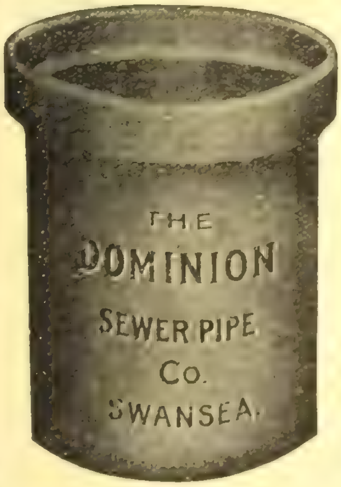

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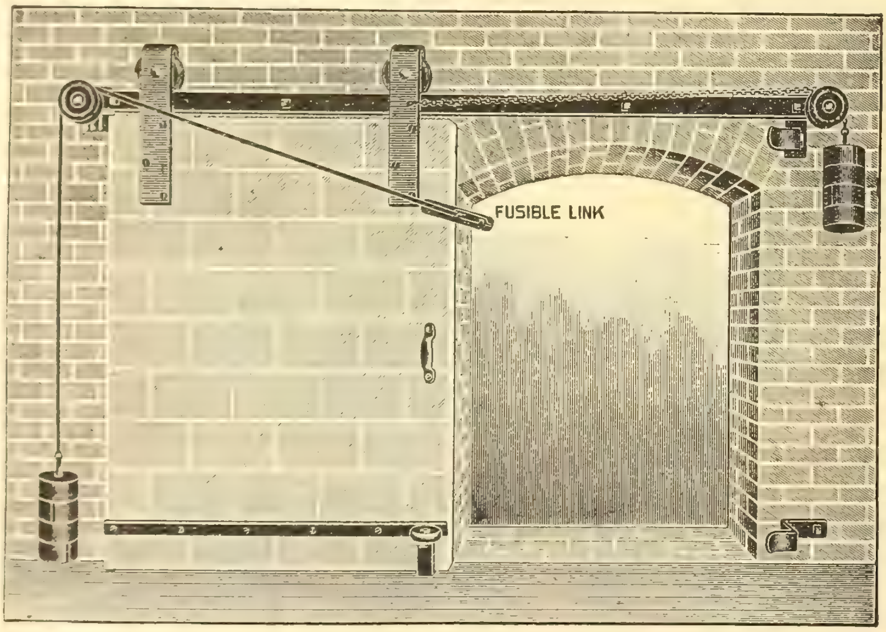

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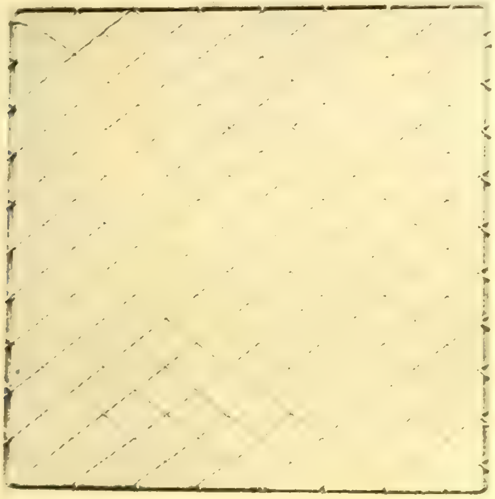

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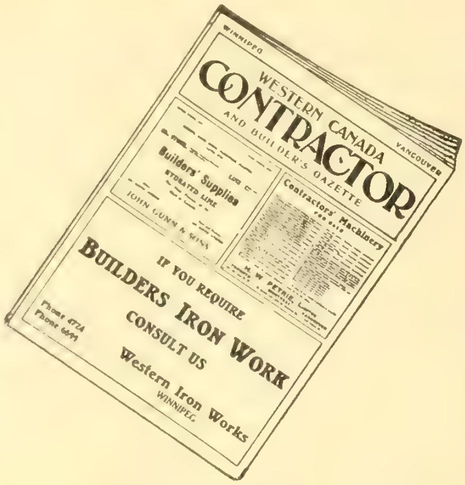

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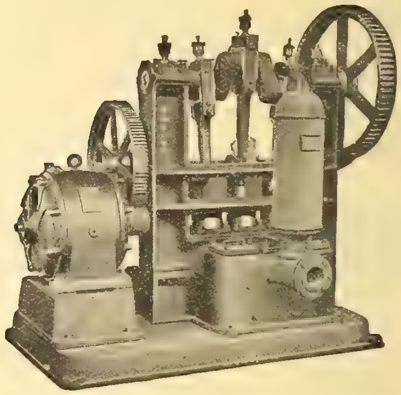

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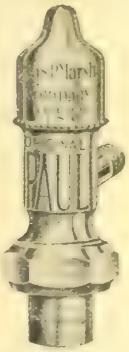

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Many prominent architects are kind enough to say that all International Products are hall-marked "Superior Quality."

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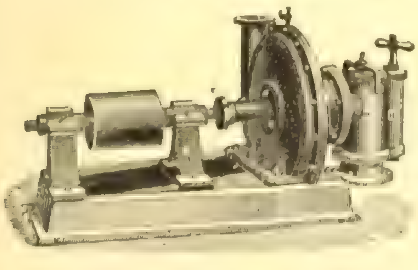

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Mine Hoists, Hoisting Engines
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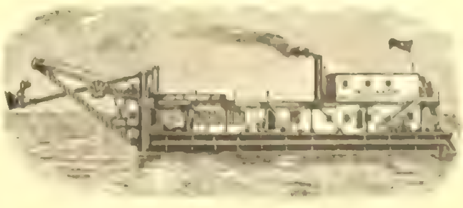
and other Contractors' Machinery.



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to use an inferior brand of plaster. A plaster that shrinks or falls off—the curse of modern building trades.

The standard of excellence is marketed in

"Hammer Brand" Hard Wall Plaster

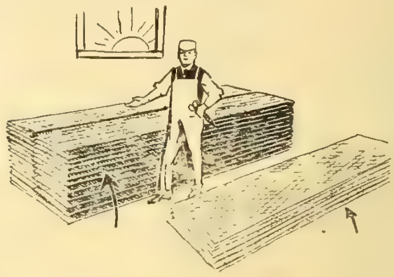
HARD-WALL PLASTER HAMMER BRAND HILLSBOROUGH, N.B.

It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

Albert Manufacturing Co.
Hillsborough, New Brunswick, Canada

Another reason for Herringbone popularity.

Because HERRINGBONE LATH is the least expensive to erect.



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It never requires pulling into shape.

The interlocking selvage edge requires no wiring between studs.

End lap is provided at the manufacturer's expense

One row of staples holds the ends of both sheets.

Three staples per stud between selvages are ample.

Net saving — nearly half the attachments.

CLARENCE W. NOBLE
GENERAL SALES AGENT
117 HOME LIFE BUILDING - TORONTO, ONT.
The Metal Shingle & Siding Co., Manufacturers

There is just one excuse for plaster ceilings:——

Only people not familiar with the multiple merits of Preston Steel Ceilings would permit a plaster ceiling to be placed in any house or store they are building. You, as a builder or contractor or architect, should see to it that your customers are made acquainted with the only modern, sanitary, fire-proof, damp-proof and PERMANENT ceiling. Let us prove its excellence to you, and you can then assert it to your customers.

Any property will rent or sell quicker when the ceilings are Preston Steel Ceilings. For these can be decorated beautifully as soon as installed—and the beauty endures. They need no repairs, for they will outlast the building itself. Yet their first cost—which is the FINAL cost—is remarkably little. Your profit is bigger, and the buyer of the property will be better satisfied. On rebuilding jobs, they can readily be used over old plaster.

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Send for big illustrated pattern book, showing a few of the many styles we offer at lowest prices. Let us send you Price List.

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Preston, Ontario
Branch Office and Factory - MONTREAL

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Turbine Pumps

High and Low Lift

These pumps have attained a world wide reputation for their excellence of design, high efficiency and ability to operate continuously for long periods, and under the severest conditions.

Single and Multi-Stage

Direct or Belt Driven

Manufactured for use throughout the Dominion of Canada by

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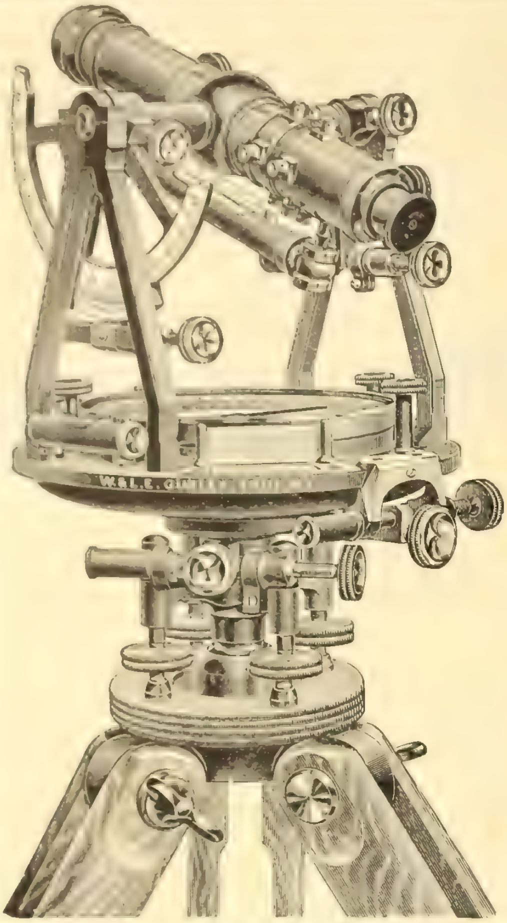

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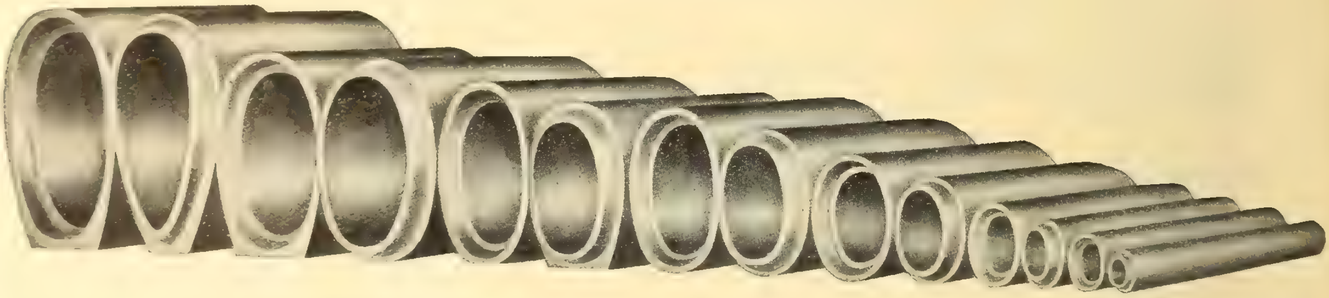

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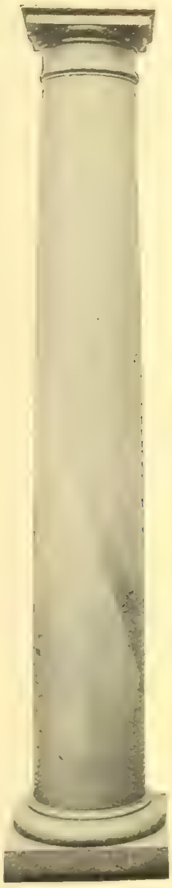

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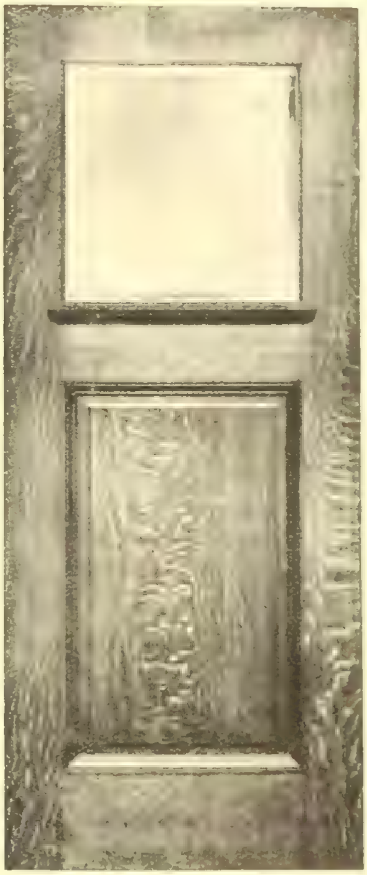
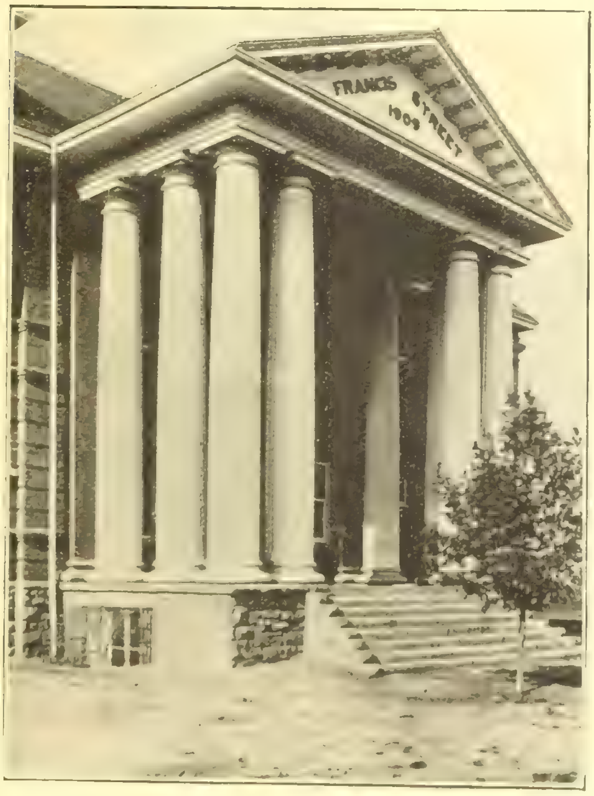


Door Style No. B.L. 31



Francis Street Public School, Fort William

The above Fluted Columns, which are 36 inches in diameter at base of shaft and 26 feet long were manufactured by us.

Our column department, which contains 10,000 square feet of floor space, is equipped throughout with special machinery mostly of our own design. We have appliances to make plain or fluted columns up to 18 inches in diameter and 10 feet long.

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374 Pacific Ave. - West Toronto

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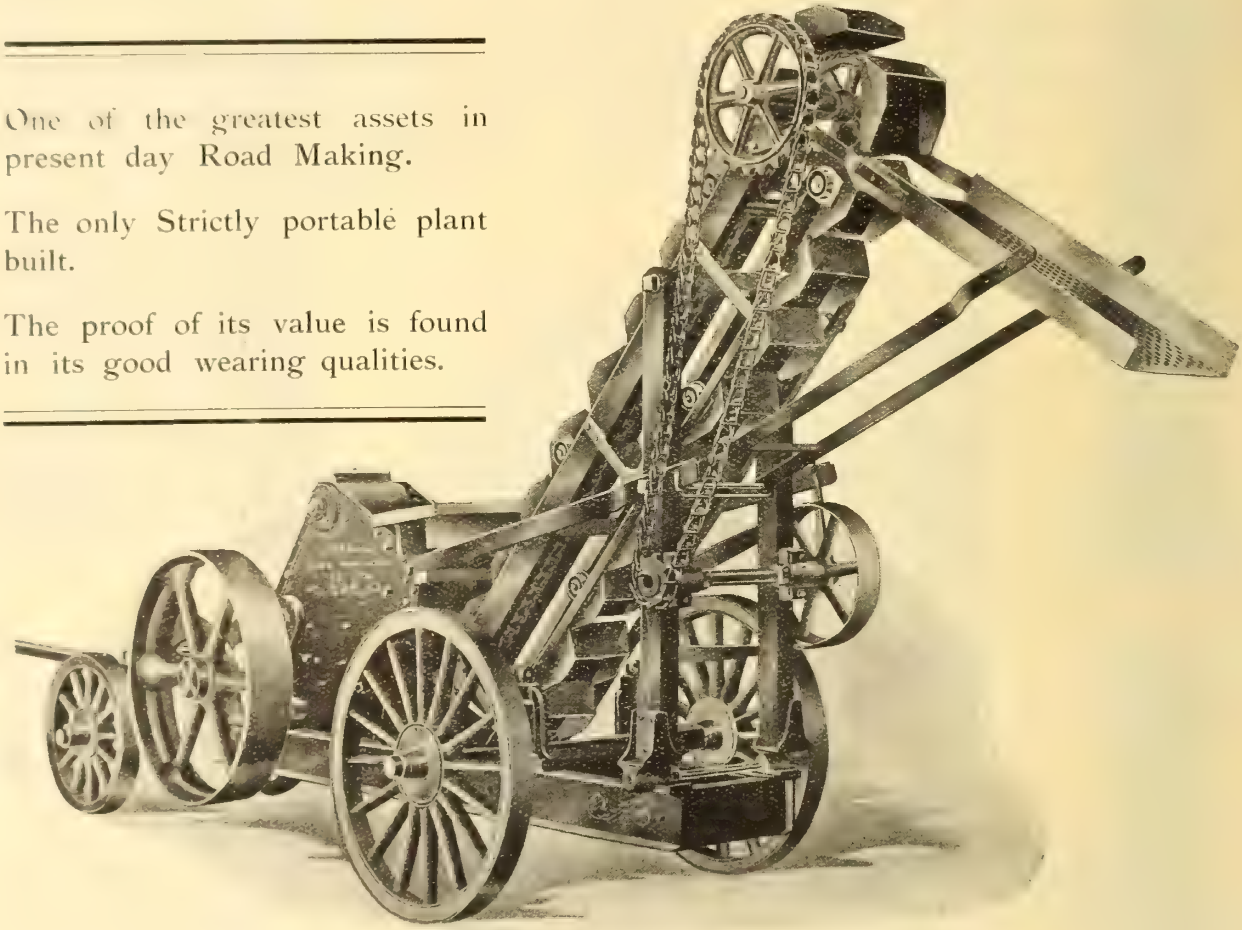
Mounted Crusher

One of the greatest assets in present day Road Making.

The only Strictly portable plant built.

The proof of its value is found in its good wearing qualities.



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Send for descriptive Catalogue of **"Champion" Crushing and Road Building Machinery.**

The Hamilton Machinery Company, Ltd.

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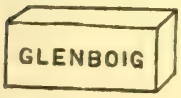

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Made in the largest and most up-to-date brick plant in Europe and used by the principal national arsenals as **First Quality.**

They **last longer** than other makes and minimise repairs.

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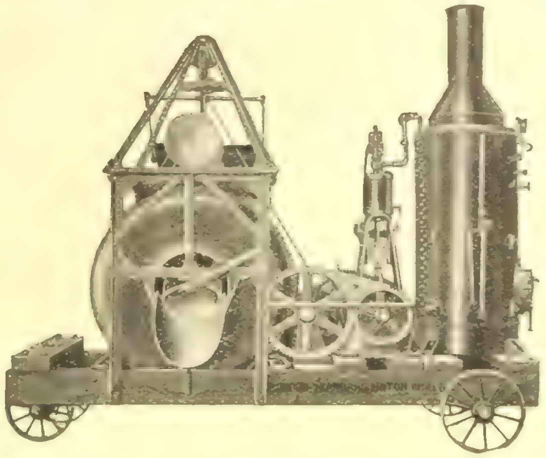

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Made in several sizes and with any equipment. This machine embodies the latest improvements in Batch mixers and is second to no other machine. Send for catalog stating capacity required.

We ALSO MANUFACTURE the now famous LONDON AUTOMATIC BATCH MIXERS Nos. 1 and 2, also Face-down Concrete Block Machines, Cement Brick Machines, Power Cement Drain Tile Machine, Hand Drain Tile Machine. Sill and Lintel Moulds. Ornamental Moulds, Cement Working Tools and a full line of Concrete Machinery.

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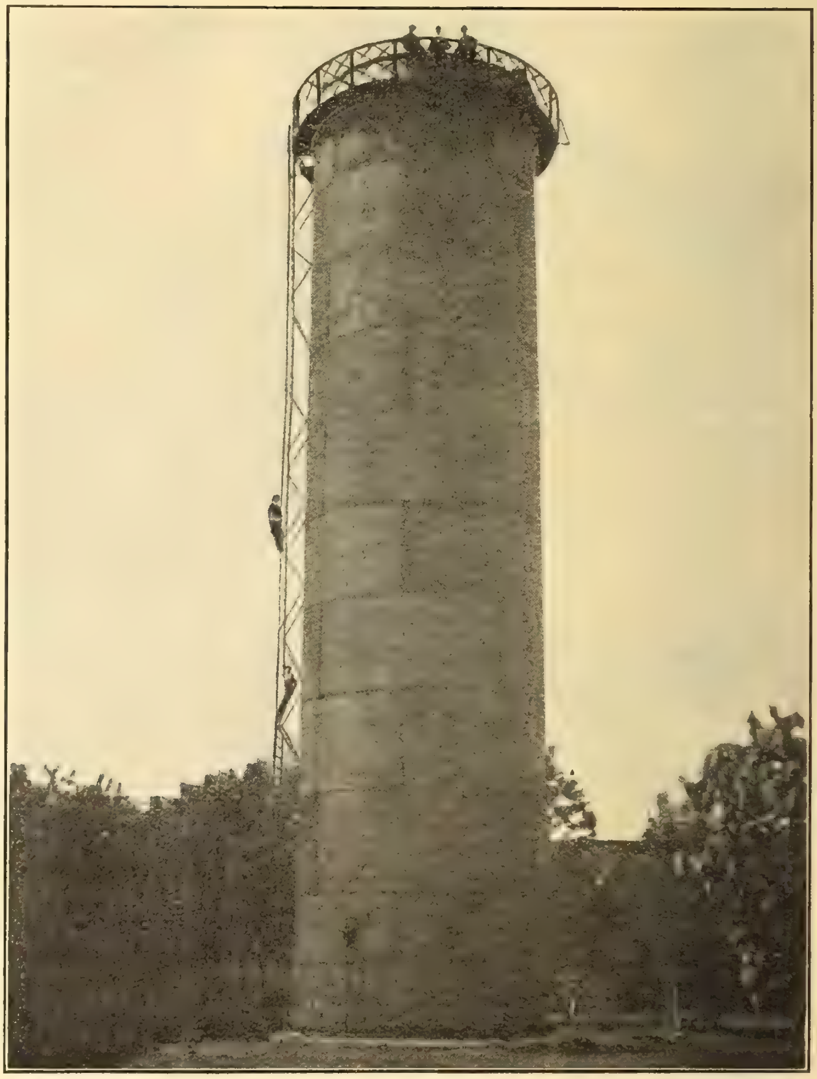

Water Tower at Whitby, Ont.

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ENGINEERS AND BOILERMAKERS Limited
14 Strachan Avenue - TORONTO, CANADA

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Guelph, Ont.

The Board of Works have under consideration the advertising for tenders from various pavement manufacturers for work on pavement to be done at so much per foot, thus gaining a fair comparison of the various cost of the different pavements on the market.

Gleichen, Alta.

The propsed waterworks will be constructed by day labor under supervision of the John Galt Eng. Co., of Winnipeg, Man.

Laprairie, Que.

The Government will construct a large trunk sewer this year connecting the following municipalities: Laprairie, St. Lambert, Longueil, Boucherville.

Montreal, Que.

City Engineer Janin denies the report that a new sewage farm is to be constructed by the city. Some alterations are being made to the existing plant, he states, but nothing else.

General Purchasing Agent, Mr. Stanton, has been instructed to prepare specifications in granite paving blocks and chain stone. 25,000 square yards of the former material, and 150,000 lineal feet of the latter will be ordered. Public tenders will be called for, addressed to the Board, and the latter's selection will be referred to Council for approval.

North Vancouver, B.C.

Tenders addressed to City Clerk, will be received until February 13th for supply and delivery of c.i. pipes as follows: 10,000 feet 4-in. standard c.i. pipe, approximate weight, 20 lbs. per foot; 5,000 feet 6-in. standard c.i. pipe, approximate weight 30 lbs. per foot; 19,400 feet 8 in. standard c.i. pipe, approximate weight 45 lbs. per foot; 9,750 feet 10-in. standard c.i. pipe, approximate weight, 60 lbs. per foot; 6,300 feet 10-in. c.i. pipe, weight approximately 75 lbs. per foot; total of about 1,134 tons. Specifications obtained from Geo. S. Hanes, City Engineer.

Oakville, Ont.

T. Aird W. Murray, of Toronto, has prepared preliminary plans for a sewer system, but nothing definite has yet been done. Chas. A. Bradbury, town clerk.

Ottawa, Ont.

Plans have been completed for the new plaza between the Dufferin and Sappers' bridges by Public Works Department. Cost will be around $80,000.

St. Catharines, Ont.

Tenders are called until February 28th for c.i. pipe and special castings; gate valves and pig lead. Advertisement in "Tenders and For Sale Department" of this issue. Tenders for pipe laying, etc., will be invited later. A. Milne, superintendent waterworks.

St. John, N.B.

The committee appointed to consider the question of paving have recommended that tenders be called for the paving of the four streets, Pond, Nelson, Mill and Dock. W. F. Murdock, city engineer.

Vancouver, B.S.

City Clerk McQueen was instructed to call for tenders for supply of brass goods for waterworks department in about three weeks' time.

Victoria, B.C.

Extensive additions to the water distribution system in Saanich municipality will be made this year to furnish about 3,000 feet of 8 in. and 24,000 of 6 in. pipe, at estimated cost of $30,000.

Wm. W. Northcott, purchasing agent, is calling for tenders until March 3rd, for 350 4-inch, 100 6-inch, and 10 12-inch double gate valves and 15 tons of pig lead. Specifications at office of above.

AWARDED

Fort William, Ont.

The Canadian Iron Corporation were awarded the contract for the supply of pipe for the summer; prices, $37.50 a ton for ordinary pipe and $60 a ton for special pipe. The Kerr Engine Co. and the Canadian Fairbanks Co. were awarded the contracts for the valves.

Point Grey, B.C.

The contract for the supply of piping for the waterworks system was awarded to Robertson, Godson & Co.

Strathcona, Alta.

Contract for installing new 18-in. intake pipe, etc., has been awarded to M. S. Caine for $4,200, this being the lowest tender. The contract calls for the completion of the work in 60 days.

Railroads, Bridges and Wharves

Dauphin, Man.

Tenders are called until February 25th for all labor and material necessary for construction of two reinforced concrete highway bridges. Advertisement in "Tenders and For Sale Department" of this issue.

Edmonton, Alta.

The by-law [illegible] for new bridge over the North Saskatchewan was carried; also that to raise $12,450 as city's share of constructing subway on Jasper avenue; also that for further sum of [illegible] for widening bridge across Groat ravine.

Lanark, Ont.

Tenders addressed to J. Boyd, Caldwell, [illegible] bridge committee, will be received until March 4th for erection of a reinforced concrete bridge over the Clyde river. Advertisement in "Tenders and For Sale Department" of this issue.

Paipoonge Tp., Ont.

On February 10th a by-law will come before the ratepayers to issue $4,000 20 year, 5 per cent. bridge debentures. G. F. Scholfield, Clerk.

Port Stanley, Ont.

Plans will be prepared for a breakwater 1,200 feet long and estimated to cost $250,000. $60,000 has already been appropriated for this. Government Engineer, Lamb.

Quebec, Que.

Tenders addressed to J. F. Guay, C.E., Morin Building, will be received until March 2nd for construction of about 56 miles of railway for the Quebec & Saguenay Railway. Advertisement in "Tenders and For Sale Department" of this issue.

Township of Barton, Ont.

On February 14th a by-law will be voted on to issue $6,500, 4½ per cent. bridge debentures. A. G. E. Bryant, Township Clerk.

AWARDED

Gravenhurst, Ont.

Contract for wharf here awarded by Public Works Department, Ottawa, to D. G. Stewart, Ottawa, $12,984.

Leitche's Creek, N.S.

Contract for wharf here awarded by Public Works Department, Ottawa, to Robert & Bart, Mosgrove, N. Sydney, $5,582.

Margaree Harbor, N.S.

Contract for breakwater extension by Public Works Department, Ottawa, awarded to Robert & Bart, Mosgrove, N. Sydney, $5,300.

Monk's Head, N.S.

Contract for breakwater here awarded by Public Works Department, Ottawa, to Dougald & A. P. McIsaac, Blacksmith, N.S., $6,255.

Port Burwell, Ont.

The contract for building the breakwater has been awarded to Mr. Hogan, Port Colborne, $234,000. Work is to be completed in 18 months from January 30.

Quebec, Que.

The contract for the new bridge at the Louis Basin has been awarded by the Harbor Commission to the Dominion Bridge Company, [illegible]. Work will be commenced without delay.

The construction of the first portion of the Quebec & Saguenay Railway will be undertaken at the opening of the present spring. The contract for the line has been awarded to the Bishop Construction Company, of Montreal, from Cap Tourment to Murray Bay. E. A. Evans, construction engineer, Quebec & Saguenay Ry.

Stratford, Que.

[illegible] pier here awarded by Public Works Department of Ottawa, to McLaughlin Bros., Ottawa, $5,-[illegible]

Vancouver, B.C.

[illegible] been started on the section of the C. N. R. between Popkum and Hope, a distance of twenty miles. The contract has been awarded to the Northern Construction Company, which already holds the contract for the first section from Port Kells to Popkum. Engineer Gwyer is in charge.

Public Buildings, Churches Schools, etc.

Alba, Ont.

Tenders addressed to John Cotnam, Alba, Ont., will be received until February 25th for erection of Greenwood Methodist Church. Plans, etc., at residence of the above.

Amherst, N.S.

F. G. Spencer, St. John, N.B., is stated to have definite arrangements made for the erection of an up-to-date- theatre here to cost about $25,000. Tenders will be called within the next two weeks. Hewson & Moore, Moncton, are interested.

Calgary, Alta.

The congregation of St. John's have decided to erect a new church at Eighth avenue. Work of construction will be started at once. Messrs. Lang & Major, architects.

A by-law is being prepared for approval of ratepayers for one, or perhaps two, new Heenan & Froud incinerators. Estimated cost of two, about $100,000.

Collingwood, Ont.

Under date of last information the contracts for erection of 8-room school here had not been awarded. Estimated cost of building, $28,000; of equipment, $2,000. John Wilson, architect.

Davidson, Sask.

On February 10th the following by-laws will be voted on by the ratepayers to issue $4,000, 20 years, 5½ per cent. Town Hall and $2,000 20 year, 5½ per cent. debentures. Arthur Jas. Robertson, Returning Officer.

Edmonton, Alta.

The by-law to raise $175,000 for improving Exhibition grounds and erecting new buildings was carried; also $3,500 to supplement the $4,000 already raised for addition to city hall.

Fort Frances, Ont.

Tenders are called until February 15th for the erection of school in S. S. No. 10, Tp. Lash. Plans, etc., at office of B. L. Phillips, Emo F. Anness, secretary.

Galt, Ont.

The congregation of Trinity Church have decided to erect a new Sunday school room. Plans call for an expenditure of about $10,000.

Grimsby, Ont.

Nothing definite has as yet been done in connection with the Carnegie public library. Jas. Aitchison, secretary library board.

Hull, Que.

The Notre Dame hall will be torn down and an up-to-date hall erected, costing about $20,000.

London, Ont.

The City Council accepted the offer of $100,000 from the Royal Bank for the present City Hall.

Tenders addressed to the Director of Contracts, Department of Militia and Defence, Ottawa, will be received until February 15th for construction of magazine building and an explosive store building here. Plans at offices of district officer, London, and the director of engineer services at above department.

Montreal, Que.

A tuberculosis dispensary is to be erected at 369 St. Catherine street east in connection with a Sanatorium at Beloil.

Tenders are being asked for by Messrs. Saxe and Archibald, Beaver Hall Hill, for the alterations to the Engineers' Club.

Mr. Leslie H. Boyd, K.C., is interested in the reported erection of Homeopathic Hospital.

Morewood, Ont.

C. P. Meredith, Ottawa, is preparing plans for continuation school here.

Outremont, Que.

A church sacristy and rectory are to be erected in the parish of St. Viateur, $125,000.

Peterborough, Ont.

Messrs. Burk, Horwood & White, architects, Toronto street, Toronto, are in charge of the erection of the Murray Street Baptist Church here.

Quebec, Que.

It is stated that plans are being prepared for an athletic club building among the French-Canadians in St. Roch.

Regina, Sask.

The Young Women's Christian Association have taken an option on three lots here as a possible buliding site. Architects are submitting preliminary sketches for the building, which will cost about $50,000.

Renfrew, Ont.

C. P. Meredith, architect, Ottawa, is preparing plans for an 8-roomed Separate school for Renfrew. The building will be of brick. Mr. Meredith is also preparing plans for an addition to a convent in Renfrew.

Stratford, Ont.

Tenders addressed to John S. Wahl, Gadshill, will be received until February 15th for erection of school at Gadshill for Union School Section No. 8, North East-Hope. Plans, etc., with above or at office of R. Bank Barber, architect, Stratford.

Thetford Mines, Que.

Tenders are called by Public Works Department until February 14th for additions to post office fittings here. Specifications at above department and on application to local postmaster.

Toronto, Ont.

The plans for the new Broadview Y. M. C. A. are completed and provide for erection of 3-storey building with basement at an estimated total cost of $75,000. Construction will start in the spring. Edmund Burke, 28 Toronto street, architect.

Tenders addressed to the Chairman of the Building Committee will be received by the architects, Darling & Pearson, until February 18th for all trades with the exception of masonry, concrete work, structural steel and terra cotta, required for the erection of surgical wing in connection with General Hospital. Plans, etc., at office of the above. Advertisement in "Tenders and For Sale Department" of this issue.

Tillsonburg, Ont.

The Public School Board have decided to build an addition of four rooms to the school. Chairman, T. C. Waller.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until February 28th for construction of public building here. Plans, etc., at office of Mr. H. J. Lamb, district engineer, London, at local post office and at above department.

Vancouver, B.C.

Plans are to be called for at once for the manufacturers' building at Exhibition park. H. S. Rolston, secretary, Exhibition Association, 319 Pender street.

The plans prepared by O. W. Moberg, architect, for pavilion were accepted. Noted in last issue.

Assisting Building Inspector R. Mackenzie is preparing plans for the fire hall to be erected on Quebec street and Twelfth avenue. The by-law recently passed appropriated $21,000 for this building.

Vernon, B.C.

Tenders are called until February 14th for post office fittings here by Public Works Department. R. C. Desrochers, secretary.

Wallacetown, Ont.

Tenders addressed to J. T. Kerr, secretary-treasurer building committee, will be received until February 18th for all trades required in the erection of church 11½ miles east of here. Plans, etc., at residence of above mentioned, and at office of N. R. Darrach, St. Thomas.

Welland, Ont.

The Presbyterian Church will go on with part of the enlargement this year according to plans adopted last year. A. E. Anderson, treasurer.

The Salvation Army will purchase property on the east side of Cross street, where a fine barracks building will be erected.

Winnipeg, Man.

The plans of William Bruce for erection of public baths have been accepted and tenders will be called.

Tenders for the different trades in connection with the erection of Selkirk Avenue Y. M. C. A. building will be received until February 14th. J. H. G. Russell, architect, McArthur Building.

AWARDED

Amherst, N.S.

The contract for the new school house on Hickman street was awarded to the Victor Wood Workers, $14,000. The building will be of brick and stone.

Calgary, Alta.

Messrs. Doyle & Thomas, of Lethbridge have been awarded the contract for erection of Colonel Walker school. Estimated expenditure, $100,000.

Peterborough, Ont.

Contract awarded by Public Works Department, Ottawa, for erection of addition to public building here to James Rose and H. Hickey, of Peterborough, $8,200.

Prince Rupert, B.C.

Contract awarded by Public Works Department, Ottawa, for erection of quarantine hospital here to Anderson & McKinnon, Prince Rupert.

Residences

Monrteal, Que.

The residence of Mr. A. McGoun was destroyed by fire on the 3rd inst. Estimated loss, $10,000.

Tenders will be called for this month for a new residence for Mr. Clarence I. de Sola, to be erected on Pine avenue.

A four-storey dwelling house is to be erected on McGregor street, and tenders for it are now being received by Mr. Kenneth G. Rea, architect.

Quebec, Que.

Negotiations were concluded on Thursday, by which the house of Browne, of Montreal, takes over the piece of land on Lagauchetiere street, comprising 18,000 square feet. A four-storey apartment house is to be erected on the site, containing 52 apartments.

St. Annes, Que.

Mr. C. B. Gordon is having a residence erected here early in the spring, and tenders will be asked for this month. Messrs. Saxe and Archibald, Montreal, are the architects.

Toronto, Ont.

The residence in course of erection for Mr. J. T. Moore was destroyed by fire one the 2nd inst. J. H. Galloway, architect, 23 Toronto street.

Messrs. J. T. Hutson have secured a site corner of Avenue road and Cumberland street, on which, it is stated, they will erect an apartment house.

Wallaceburg, Ont.

Tenders will be received until February 10th by Mrs. S. A. Milner, 2 Brisco Block, Chatham, for erection of brick tenement building here. Plans, etc., at office of S. G. Kinsey, architect, Merchants Bank, Chatham.

Westmount, Que.

Mr. F. G. Walter will build a semi-detached brick and stone house on Belvedere avenue.

The Osmonde Sharpe Construction Co. will build a pair of semi-detached residences in reinforced concrete and brick on Victoria avenue.

Messrs. Charbonneau Bros., Westmount, are preparing plans for two houses to be erected on Selby street at a cost of $12,000.

Messrs. Saxe & Archibald have plans in hand for the following Westmount properties and will ask for tenders within the next few days: residence on Forden avenue for S. W. Stevenson, Esq.; Aberdeen avenue, for J. B. Hathaway, Esq.

Winnipeg, Man.

Recent building permits include I. Noe, two houses on the north side of Stella, $6,000; Johnson & Bjornson, dwelling on the east side of Alverstone, $2,600; Kristjanson & Bjornsson, dwelling, Alverstone, $3,000.

AWARDED

Montreal, Que.

Contracts have been awarded for the plumbing and tiling of the house of Mr. J. M. Wilson, Ontario avenue; the former to Messrs. W. J. McGuire & Co., and the latter to the Sanitary Tiling Co.

Business Buildings and Industrial Plants

Berlin, Ont.

Under date of last information plans for the brick addition to the plant of The L. McBrine Co., Ltd., had not been prepared.

Brantford, Ont.

Mr. Chester Harris has purchased property on Bridge street on which, it is stated, he will erect a 2-storey brick garage, 64 x 40.

Buckingham, Que.

The Gauthier and Raby and Marwell buildings were destroyed by fire on the 2nd inst. Estimated loss, about $6,000.

Calgary, Alta.

It is reported that the Hudson Bay Company have purchased a site further west from their present one on which large buildings will be erected.

Dryden, Ont.

The plan submitted to council by the Dryden Timber & Power Co., for the pulp mill, call for a building 400 feet in length, 250 feet wide, and provide for shipping rooms, screens and wet machines, etc.

Guelph, Ont.

It is stated that the new buildings for the Homewood Sanitarium to replace those recently burned, will cost about $120,000.

Halifax, N.S.

The building occupied by the Merchants Bank of Canada was damaged on the 5th inst. to the extent of about $150,000.

It is stated officially that the C. P. R. is arranging to have two large modern hotels erected in Nova Scotia, one at Digby, and one at Halifax.

Montreal, Que.

The Holt, Renfrew Co., Ltd., have purchased property adjoining their present premises on which they will construct an 8-storey fireproof block as soon as they come into possession.

Mr. John Thilbin is building a store on St. Catherine street.

Plans for the new Herald building are now being prepared by Messrs. Ross & MacFarlane.

The Gillette Razor Company have purchased land on Alexander street upon which they will erect a $100,000 factory.

Extensive alterations and additions are to be made to the offices of the Montreal Rolling Mills. Plans are being prepared by Mr. Kenneth G. Rea.

A factory is to be erected at the corner of Duluth avenue and [illegible] street by the Western Manufacturing Company.

Messrs. Henry Birks & Co., it is reported, will erect an 8-storey fireproof building on the southwest corner of Cathcart street and Union avenue. Plans have not been prepared.

The Colonial Real Estate Company, Montreal, will erect a ten-storey building on St. Catherine street west, extending from Balmoral to Mance streets. The building, which will be of reinforced concrete, faced with terra cotta, is being designed and will be erected by Henry Morgan & Co., Ltd.

Nairn Falls, Que.

Plans have been prepared for the new ground wood mill of the East Canada Power and Pulp Company, Ltd. This company have taken over the limits of the Murry Bay Lumber & Pulp Company and the property of the Labrador Power Company. Engineer in charge, Mr. Geo. F. Hardy, New York City. The intention is to erect a plant which will incorporate the most advanced Swedish and Canadian practises in the manufacture of ground wood. R. Forget, Montreal, president; L. C. Haskell, Montreal, secretary-treasurer.

Sarnia, Ont.

The Imperial Oil Company is said to be acquiring options on land in the vicinity of the refinery here, for the purpose of making improvements and extensions.

Stewart, B.C.

Mr. Perry Finch, 1256 Yates street, Victoria, is authority for the statement that Finch & Hickey will rebuild their departmental store here, destroyed by fire recently.

Strathcona, Alta.

On the 31st ulto. fire destroyed the stores of Bright & Ashbaugh; Cook & Orr and the up-town office of the O'Brien Lumber Company. Total loss, about $40,000.

P. Burns has purchased additional property in the south end, on which, it is stated, a paving plant costing about $1,500,000 will be erected shortly.

Toronto, Ont.

Tenders addressed to Curry & Sparling, 90 Yonge street, will be received until February 15th for erection of fireproof building.

The Dominion Bank will build new branches at the following points in Toronto: southeast corner Bloor and Dovercourt; southeast corner Lee avenue and Queen street, southwest corner St. Clair avenue and Vaughan road.

The Canadian Pacific has filed plans for its proposed new freight yards and sheds on the property bounded by Simcoe, Dorset and King streets, including the present site of government house.

Tenders addressed to Geo. A. Mitchell, master of B. and B., room 414 Union Station, will be received until February 13th for the purchase and removal of the following houses, Empress Crescent, 10, 22, 24; Dunn avenue, 57, for the G. T. R.

The Imperial Bank is stated to have secured the adjoining property to the corner of Buchanan and Yonge streets, purchased some time ago, on which a large building will be erected.

Truro, N.S.

[illegible] out. Loss, $20,000

Vancouver, B.C.

Plans have been presented to Building

(Continued on page 31)

Tenders and For Sale Department

DREDGES FOR SALE

A [illegible] yard Beatty dredge in first-class shape, [illegible] miles of railroad station, suitable for dredging or ditching; also a half yard machine with portable oak hull in first-class shape. Apply FRED. A. ROBERTSON, Cornwall, Ont.
4-6

TO ARCHITECTS

CASH PRIZES of One Hundred, Seventy-five, and Fifty Dollars are offered for competitive Preliminary Sketches of proposed new Sabbath School building and Church Parlors for Orillia Presbyterian Church, Sketches to be in hands of undersigned not later than February Fifteenth. Full information may be had from J. J. THOMPSON, telephone 261, Orillia.

5-6 T. G. KING, Secretary.

Notice to Contractors

Whole or separate sealed tenders endorsed "Tender for School," will be received by the undersigned at his residence, Gadshill, up to 12 o'clock noon, **15th** inst., for the erection of a school house at Gadshill for Union School Section No. 8, North East-Hope. Plans, specifications, etc., may be seen at Gadshill or at residence of R. Bank Barber, architect, Stratford. The Trustee Board do not bind themselves to accept the lowest or any tender.

JOHN S. WAHL.

Gadsaill, February 3, 1911. 6-6

City of Strathcona
(Alberta)

Tenders for

Engine, Boilers and Generators

Tenders addressed to David Ewing, Chief Engineer power house, Strathcona, Alta., for the above machinery, will be received until noon, Wednesday, March 1st, 1911. Specifications may be obtained upon application to the undersigned.

A. J. McLEAN,
City Engineer.

Strathcona, Alta., Jan. 16, 1911. 4-8

The City of Calgary

Tenders will be received by the City Commissioners up to the 20th day of February, 1911, for 200 (more or less) 5-light ornamental lamp posts to be delivered in carload lots as required. All persons tendering will submit their designs, together with full dimensions, weights, etc.

Globes are to be of light alabaster. Eash post must be equipped with standard Edison sockets, all complete and ready for wiring up. Tenderer will also submit prices on extra globes which might be required. Tungsten lamps will be supplied by the city. A cheque for two per cent. of the bid must accompany all tenders. The city reserves the right to accept the whole or any part of a tender; the lowest or any not necessarily accepted.

Dated at Calgary, January 27th, 1911.

A. G. GRAVES,
5-6 City Commissioner.

For Sale — Second Hand

No. 8 Austin Gyratory Crusher.
No. 6 and No. 3 Austin complete plant.
No. 3 Austin and 2 No. 6 Gates and No. 5 "B."
70-ton Vulcan Steam Shovel, 2-yard.
50-ton Bucyrus Steam Shovel, 1¾-yard.
Loco. Crane, with 1¼-yard Clam Shell.
Little Giant Traction Steam Shovel, 1¼ yard.
Hayward Orange Peel Buckets, 1 and 1¼-yd.
Concrete Mixers, Steam Rollers, Air and Steam Drills, Air Compressors, Locomotives, Dump Cars, etc.

All our goods we fully guarantee.
Send for our February Booklet.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

St. Catharines Water Works

TENDERS

Sealed tenders addressed to "The Chairman Water Works Commision," endorsed "Tenders for Pipe and Specials"—Gate Valves—Pig Lead, will be received up to noon on **Tuesday, February 28th, 1911**, for the cast iron pipe and special castings 12-in. to 36-in., Gate Valves 4-in. to 36-in., and pig lead required.

Specifications, forms of tender and full particulars may be obtained at the office of The Commission, City Building.

The Commission does not bind itself to accept the lowest or any tender.

ALEX. MILNE,
Superintendent.

St. Catharines, Ont., Feb. 2, 1911. 6-7

Town of Dauphin
Province of Manitoba

Tenders for Reinforced Concrete Highway Bridge

Sealed tenders addressed to the undersigned Town Clerk will be received up to 8 p.m. **Saturday, the 25th day of February, 1911**, for all labor and material necessary for the construction of two reinforced concrete highway bridges to be constructed in the Town of Dauphin.

Plans and specifications will not be sent out, but may be seen at the Town Clerk's office, Dauphin, Man., or at Provincial Public Works Department, Winnipeg, Man.

The lowest or any tender not necessarily accepted.

H. F. CALDWELL,
Mayor.

A. H. F. STELCK,
Chairman Public Works Committee.

J. W. JOHNSTON,
6-8 Town Clerk.

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No ten cents extra

ARCHITECT, highest qualifications and experience, would take charge of office or consider partnership. The West preferred. Box 200, Contract Record, Toronto, Ont. 4-7

TENDERS WANTED

The Quebec & Saguenay Railway

Tenders will be received up to March 2nd, **1911**, at 5 o'clock p.m., by the undersigned, for the construction of about 56 miles of the above railway, from Cap Tourmente to Murray Bay Wharf, divided up into sections of ten miles.

A certified cheque amounting to $2,000 for each ten mile section tendered for must accompany each tender.

Forms of tender may be obtained and specifications and plans examined at the office of J. F. Guay, Civil Engineer, Morin Building, Quebec.

The right is reserved by the company to reject any or all tenders.

6-6 (Signed) J. F. GUAY.

St. Augustine's Seminary

Tenders will be received by the undersigned until 12 o'clock noon on **Saturday, the 18th inst.**, for the plastering, roofing, flooring, tiling, painting and glazing and iron stairways required for St. Augustine's Seminary on the Kingston road, near Toronto.

Plans and specifications may be seen at the office of the Architect.

Satisfactory bonds to the effect of one-half of the amount of contract will be required for the faithful performance of the contract.

The lowest or any tender not necessarily accepted.

Arthur W. HOLMES,
Architect.

10 Bloor street east. 6-6

Tenders

Toronto General Hospital

Tenders addressed to the Chairman of the Building Committee will be received by the undersigned up till noon, **Saturday, February 18th, 1911**, for all the trades, with the exception of masonry, concrete work, structural steel and terra cotta, required for the erection and completion of the Surgical Wing in connection with the General Hospital.

Plans and specifications and all other information can be obtained at the office of the architects,

DARLING & PEARSON,
2 Leader Lane.

The lowest or any tender not necessarily accepted. 6-6

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

AGENTS WANTED—Large United States Terra Cotta company desires high-class agencies for Canada. Send particulars to W. D. Ward, Tribune Building, New York City. 4-6

CAPITAL WANTED for interior fitting factory doing a first-class business in bank and store fixtures. Splendid equipment and first-class connection. Preference stock for $20,000 to be issued. Apply for particulars to Box 207 Contract Record, Toronto. 5-6

Tenders for Bridge

Tenders will be received by the undersigned up to 6 o'clock p.m., **Saturday, the 4th day of March, 1911**, for the erection of a reinforced concrete bridge, single span over the Clyde River at a point about 3 miles north of Lanark Village. Bridge about 70 feet long.

Plans may be seen at the office of the undersigned at Lanark, or tenderers may submit their own plans and specifications.

Deposit of ten per cent. to accompany each tender, which will be returned if tender not accepted.

The lowest or any tender not necessarily accepted.

Dated this 2nd day of February, 1911.

J. BOYD CALDWELL,
Chairman of Roads and Bridges Com.
Lanark, Ont. 6-9

Tenders

Foundry and Machine Shop in the Town of Welland, in the County of Welland For Sale By Tender

Foundry and Machine Shop in the Town of Welland, in the County of Welland For Sale by Tender.

Sealed Tenders marked "Tender for The Robertson Machinery Company, Limited," will be received by the undersigned up to twelve o'clock noon on **Tuesday, the 21st day of February, A.D., 1911**, for the purchase, en bloc, of the assets of The Robertson Machinery Company, Limited, Welland, Ont., which is unusually well situated, being on the Grand Trunk Railway, with switching rights to all other railways, consisting of:—

Land, Factory site, part of Block W., about 4 acres, with right to switch, including building 70 ft. x 112 ft. —besides store rooms, motive power, cupula, line shafting, etc.		$11,290.00
Iron working machinery		3,945.00
Wood working machinery		250.00
Pullies		641.00
Small tools:—		
Machine shop	$1,000.00	
Foundry	511.00	
		[illegible]
Hoisting engines and parts		1,500.00
Foundry merchandise		632.00
General merchandise		2,500.00
Office furniture and fixtures		275.00
		[illegible]

An inventory will be mailed upon request. The plant has not been shut down. It is excellently located, and has been doing a good business.

Each tender must be accompanied by a certified cheque, payable to the Assignee, for the sum of one thousand dollars, the balance of the purchase price to be paid within thirty days, without interest, when immediate possession can be given.

Dated this 1st day of February, A.D. 1911.

J. F. GROSS, Asignee,
Welland, Ont.

6-7

Positions Vacant

Advertisements under this heading two cents a word per insertion

Superintendent wanted for interior fitting factory, manufacturing a high class of fittings, must be able to invest from three to five thousand dollars. Only practical man and a pusher considered. To such good returns guaranteed. Apply with particulars to Box 208, Contract Record, Toronto. 5-6

Business Buildings and Industrial Plants

(Continued from page 29)

Inspector Jarrett for a warehouse on Howe and Hastings street.

Welland, Ont.

Tenders for the purchase of The Robertson Machinery Company, Limited will be received until February 21st. Advertisement in "Tenders and For Sale Department," this issue.

Col. L. C. Raymond, it is stated, will build a 2-storey brick block on Cross st.

Plans are being prepared for the extension of the Ross block on East Main street. Mr. D. Ross, Welland, is interested.

Weymouth Bridge, N.S.

The Campbell Lumber Company, whose plant was destroyed by fire on January 23rd, will immediately erect a new building. They are undecided as yet whether to install a pulp mill or a power plant, but expect to settle the matter shortly. The building will probably have concrete foundations with steel superstructure and corrugated iron. If the pulp mill is erected it will have the latest improved wet machines, screens, etc. An up-to-date saw mill will also be installed in connection with the pulp mill.

Windsor, Ont.

The Moloney Electric Co., of St. Louis, Mo., will establish a Canadian branch here.

Winnipeg, Man.

The new building for Gowans-Kent Western, Limited, will be eight storeys, of reinforced concrete. Architects, Jas. Chisholm & Son; contractors, Carter-Halls-Aldinger Company.

Mr. Geo. M. Ellis, automobile manufacturer, has secured option on 30 acres of land east of the Seine River as a building site for a factory about which negotiations are being carried on with city council. J. B. Cote, city clerk.

Woodstock, N.B.

The sawmill and factory owned by Mr. Hayden were destroyed by fire on the 31st ulto. No loss stated. Mill will be rebuilt.

AWARDED

Ottawa, Ont.

The Ottawa Car Company is building 20 cars of the pay-as-you-enter type for the Ottawa Street Railway at a cost of $8,000 each.

John M. Garland, Son & Co. will erect a large addition to their warehouse, corner Queen and O'Connor streets, this spring. The annex will be as large as the present seven-storey building and similar in design.

Quebec, Que.

Mr. J. A. Labouche has received a contract from the Transcontinental Railway Commission for demolishing Champlain Market Hall to make way for the railway terminals.

Regina, Sask

Smith Bros. & Wilson, Regina, were awarded contract for the warehouse here, $15,000. Owner, Hany Bros. & Nellimore, Winnipeg; architects, Storey & Van Egmond.

Saskatoon, Sask

The contract for the 6-storey hotel has been awarded to Carter Halls Aldinger Co., Winnipeg. Estimated expenditure, $300,000. Architects, Brown & Vallance, Montreal. Hon. Edward Cole, president Saskatchewan Investment & Trust Co., is interested.

Sydney, N.S.

It is stated that the Dominion Steel Corporation will erect a $150,000 office building, Prince street and Old Victoria road, to replace the building recently destroyed by fire.

Toronto, Ont.

The Independent Glass Producers, Limited, have a permit for a two-storey brick and metal-clad factory, Carlaw avenue, $20,000.

Power Plants, Electricity and Telephones

Calgary, Alta.

Tenders are being called by City Commissioner until February 20th for the supply of ornamental lamp posts. A. E. Graves, City Commissioner. Advertisement in "Tenders and For Sale Department" of this issue.

Dundas, Ont.

The council have passed the by-law authorizing contract with the hydro-electric company and raising $12,000 by debentures for erecting a portion of the necessary distribution plant.

Edmonton, Alta.

Application has been made to the Dominion Government by this city for power rights on the Grand Rapids on the Athabasca River. Plans filed with the application show a maximum power, if all the dams are built, of 60,000 horsepower.

Guelph, Ont.

Tenders are being received by the Street Railway Commission for construction of new branch to be built in St. Patrick's Ward.

Liverpool, N.S.

A scheme is on foot to harness the extensive water powers in this vicinity for the purpose of supplying electricity. Surveying operations under the supervision of Mr. Holgate, Montreal, are being carried on. J. L. McLeod and Geo. S. McLaren, pulp mill owners, Liverpool, are interested.

London, Ont.

At the annual meeting of the London Street Railway directros it was decided to build an up-to-date steam power plant, and abandon the proposals for the use of hydro-electric power from Niagara.

Ottawa, Ont.

The Morrisburg & Ottawa Electric Railway are seeking a franchise to build a railway along Main street to connect with the Ottawa Street Railway. C. M. Willard, Morewood, Ont., president.

Prince Rupert, B.C.

Until March 2nd tenders will be received for $40,000, 20 year, 4½ per cent., telephone debentures. Ernest A. Woods, City Clerk.

Pincher Creek, Alta.

Tenders are called until February 20th for issue of $22,000 electric light debentures. G. D. Plunkett, secretary-treasurer.

Renfrew, Ont.

Engineers of the Hydro-Electric Commission are here to visit the upper lakes of Bonnechere River, looking for sites for dams for storage purposes. The town is expending [illegible] for power development.

Renfrew, Ont.

A report was received from the engineers re the building of reservation [illegible] on the upper lakes of the Bonnechere to the effect that a 10-ft. dam on the outlet of Lake Clear could raise the water [illegible] feet, thus giving additional power for 100 days during the low water period of the Bonnechere.

Regina, Sask.

The contract for supply of rails, etc., for municipal railway here went to U. S. Steel Products Co., of which the details are as follows: 560 gross tons 80 lb. Lor[illegible] rails at $58.84; 247 gross tons A. S. C. E. 60 lb. rails at $50.50 620 pair Lorain splice bias at $3.10 per cwt.; 460 pair A. S. C. E. splice bias at $2.45 per cwt.; 5560 Lex. head bolts at $4.50 per cwt.; 6,000 rail spikes at $2.60 per cwt.; 2200 rail bonds M.P.3 4/0 13 inch c-c at $46.25 per cwt.; 100 cross bonds C. P. X. 4/0 60 inch c-c at $91.00 per cwt.; 20 cross bonds C. P. X. 4/0 66 inch at $98.00 per cwt. L. A. Thornton, city engineer.

The plans of the city commissioners call for the laying of five and one-half miles of street railway track during the present year, at a cost of about $135,000, and the laying of six miles of track during the year 1912 at a cost of about $125,000.

The rails necessary for the completion of the work outlined by the city commissioners have been ordered and a considerable portion delivered already.

The total estimated cost of the work during the present year is $213,000, and for 1911 and 1912, $402,000. The estimates of the commissioners for the present year provide as follows:

Five and one-half miles track	$135,000
Six cars	38,500
Snow sweeper	4,500
Power unit	20,000
Car barns	15,000
	$213,000

For 1912 provision is made for the addition of seven cars.

Sherbrooke, Que.

The ratepayers voted on February 6th on the "Drop Off" Power development by-law.

Winnipeg, Man.

Tenders addressed to Chairman, Board of Control, will be received until February 22nd for the following items, specification No. 63, conduit, 1911; specification No. 64, construction of conduit runs, 1911. Specifications, etc., obtained from power engineers, Smith, Kerry & Chace, Carnegie Library; M. Peterson, secretary.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until March 3rd for the manufacture of a motor car for use on standard guage railway track. Specifications, etc., at office of power engineers, Smith, Kerry & Chace. M. Peterson, secretary.

Miscellaneous

Ottawa, Ont.

The Government has called for tenders for the construction of the ten new vessels of the Canadian navy, viz., four Bristols and six destroyers of the latest improved type. The plans and specifications are based on the plans received from the Admiralty last fall and embrace the very latest advances in naval science. The tenders are not publicly advertised, since following the rule of the Admiralty, details have to be kept secret, and only firms in whom the department has confidence and who might be bona fide tenderers, will have access thereto.

Recent building permits include W. A. and J. B. Lamb, repairs to office building, W. G. Adamson, contractor, $4,000; William Weston, dwelling Percy street, $2,900; A. Larocque, dwelling, Blackburn avenue, $3,500.

Toronto ,Ont.

Tenders addressed to the Postmaster-General, Ottawa, Ont., will be received until March 17th for manufacture and delivery at Toronto of one or more motor trucks. Specifications obtained from chief post office superintendent, Room 1 Post Office Building. G. C. Anderson, superintendent mail contract branch.

AWARDED

Bassano, Alta.

The contract for the construction of a great dam on the Bow River here has been let by C. N. R. The contract for the excavation work was let to Jense, McDonnell & Company. The concrete work will be done by Walker, Fisher & Company.

Ottawa, Ont.

The following contracts have been awarded by the Public Works Department: Two dump scows for dredge Mud Lark, British Columbia, Ross and Howard, Iron Works Co. Ltd., Vancouver, B.C., $10,800; Quinze, Pontiac County, transportation of cement for dam, Geo. H. Rochester, of Haileybury, about $5,000, and T. Simard, of Ville Marie, P.Q., for about $3,000; gasoline motor tug to tend dredge King Edward, B.C., to Vancouver Ship-Yards, Ltd., Vancouver, $6,850; French River, Indian Reserve, dam and sluice ways, J. F. Boyd, Sault St. Marie, about $13,000.

New Companies

Eastern Paper Company, St. Basile, Que., incorporated, capital, $100,000. Incorporators, E. R. Pepin, manufacturer, J. O. Collette, foreman, both of St. Basile.

Central Canada Iron and Steel Corporation, Montreal, Que., incorporated, capital, $500,000. Incorporators, G. V. Cousins and O. B. MacCallum, barristers, S. T. Mains, accountant, all of Montreal.

Standard Chemical Iron and Lumber Company of Canada, Limited, Toronto, Ont., incorporated, capital, $6,000,000. Incorporators, J. Wood and T. W. Lawson, barristers, both of Toronto.

The Erie Timber and Land Company, Limited, Toronto, incorporated, capital, $100,000. Incorporators, A. H. Royce and R. B. Henderson, barristers, both of Toronto.

Britsh Canadian Lumber Corporation, Limted, Montreal, incorporated, capital, $20,000. Incorporators, F. H. Chrysler, C. J. R. Bethune, both solicitors, Ottawa.

The Western Manufacturing Company, Limited, Winnipeg, Man., incorporated, capital, $250,000. Incorporators: C. M. Boynton, R. T. Ferguson, law clerks, all of Winnipeg.

The Canadian Kellog Company, Limted, Montreal, Que., capital, $25,000, incorporated to design, etc., and contract for and deal in pipes, fittings, valves, etc. Incorporators, J. A. Mann, C. G. Mackinnon and J. T. Hackett, advocates, all of Montreal.

The Brockville, Construction Company, Limted, Ottawa, incorporated, capital, $2,000,000. Incorporators, John Black, broker, R. T. Mullin, barrister, Montreal, and G. C. Hurdman, lumberman, Ottawa.

The Winnipeg Bridge and Construction Company, Limited, Winnipeg, incorporated, capital, $60,000. Incorporators, John Frankman, bridge contractor, H. Frankman, bridge contractor; James Frankman, bridge contractor, all of Minneapolis, Minn., U.S.A. Johannes LaCour, civil engineer, Winnipeg.

The Twin Lake Lumber Company, Limited, Nipissing, Ont., incorporated, capital, $40,000. Incorporators, H. E. Hurlburt and Edward Floyd Armstrong, lumberman, both of Nipissing.

Great Lakes Lumber Company, Limited, Owen Sound, Ont., incorporated, capital, $40,000. Incorporators, W. A. Rowland, H. E. Rowland, and J. M. Rowland, lumbermen; A. G. Mackay, barrister, all of Owen Sound.

The Louise Lumber Company, Megantic, Que., incorporated, capital, $20,000. Incorporators, Thos. Malcolm Craig, lumber dealer, Sherbrooke, Que., L. Bolduc, lumber merchant, and E. Huard, merchant, Megantic.

Canadian Quarries and Construction Company, Limited, Ottawa, Ont., incorporated, capital, $2,000,000. Incorporators, John Black, broker, and R. T. Mullin, barrister, both of Montreal, and S. Bidsky and G. C. Hurdman, lumberman, both of Ottawa.

Central Canada Iron and Steel Corporation, Limited, Montreal, Que., incorporated, capital, $500,000. Incorporators, G. V. Cousins, and O. B. MacCallum, barristers, both of Montreal.

Quebec Pulp & Paper Company, Limited, Montreal, Que., incorporated, capital, $15,000,000. Incorporators, C. G. Greenshields and E. R. Parkins, advocates, both of Montreal.

Standard Chemical Iron and Lumber Company of Canada, Limited, Toronto, incorporated, capital, $6,000,000. Incorporators, J. Wood and T. W. Lawson, barristers, both of Toronto.

The George N. Kernohan Lumber Company, Limited, London, Ont., incorporated, capital, $40,000. Incorporators, G. N. Kernohan, lumber merchant, and J. M. McEvoy, barrister, both of London.

The Lethbridge Brick Company, Limited, Sault Ste. Marie, Ont., incorporated, capital, $20,000. Incorporators, W. W. Lethbridge, brickmaker, D. D. McPhail and K. M. Wright, contractors, both of Sault Ste. Marie.

La Compagnie G. Blais, Limitee, S. Euphemie, Que., incorporated, capital, $45,000. Incorporators, G. Blais, merchant, Z. Cloutier, manufacturer, both of St. Pierre de la Riviere du Sud.

The Brockville Construction Company, Limited, Brockville, Ont., incorporated, capital, $100,000. Incorporators, W. S. Buell, J. H. Botsford, barristers, both of Brockville.

A. J. Sequin, electrician, Ottawa, is stated to have sold assets.

Finch & Jones, lumber merchant, Corbin, B.C., are stated to have been succeeded by Riverside Lumber Company, Limited.

Contractors' and Builders' Supplies

Crushed Stone

For Concrete Fireproof Construction, Roadwork and Sidewalks

Rubble, Portland Cement

CRUSHED GRANITE for Floors and Sidewalks
SEWER PIPE WEEPING TILE
FIRE BRICK FIRE CLAY

Crescent Fire Brick

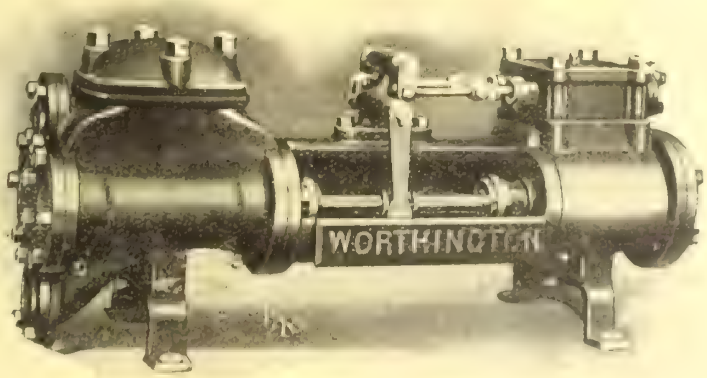
We are exclusive Distributing Agents for this high grade, hand-made fire brick. Large stock always on hand.

Don't forget our Prompt Delivery Service.

The Rogers Supply Co. - Toronto

Head Office: 28 King Street West Phone Main 4155

WORTHINGTON STEAM PUMPS



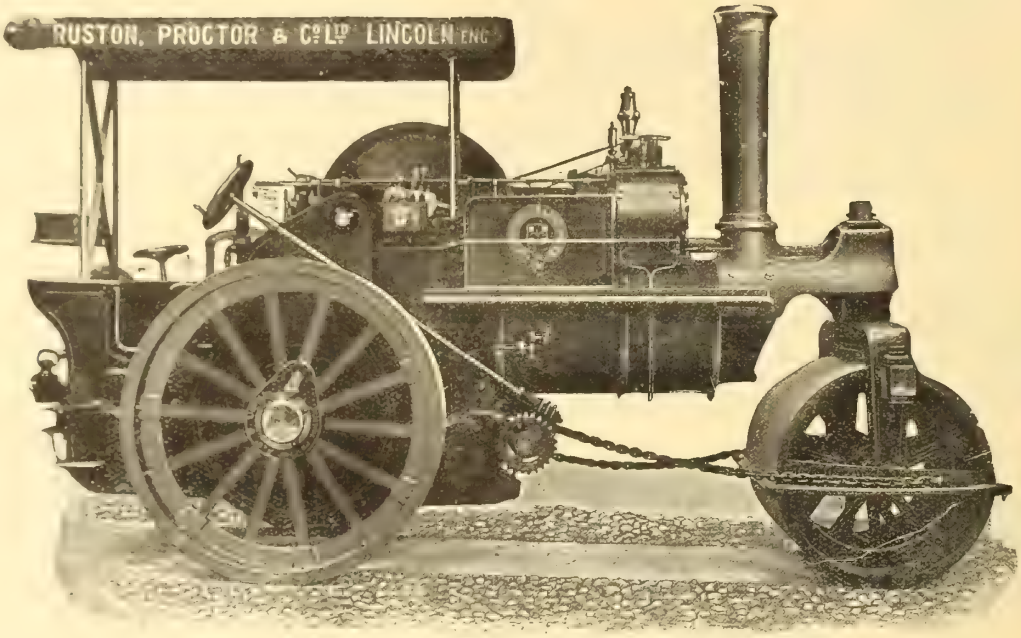
IN STOCK FOR

Boiler Feed
Water Works
Fire and
General Purposes

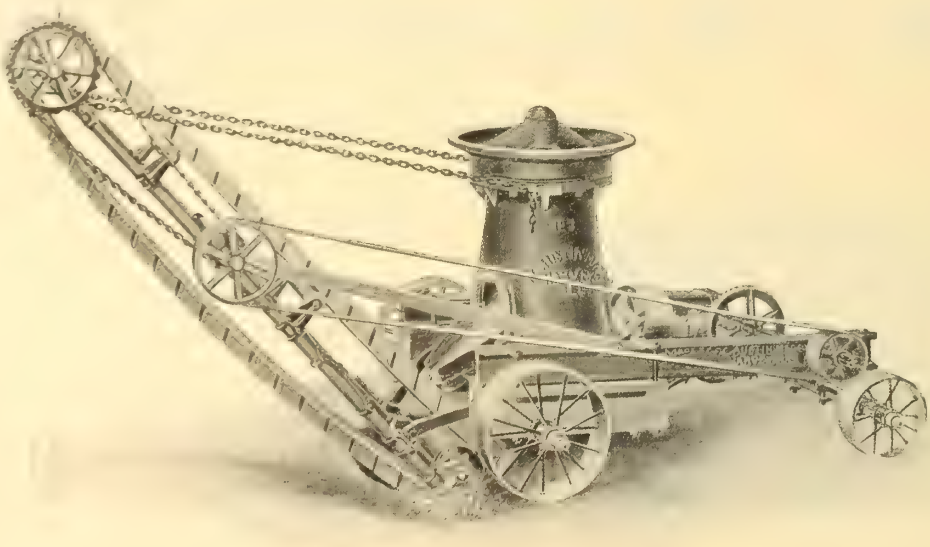
Works:
512 William St. Montreal

**THE JOHN McDOUGALL
CALEDONIAN IRON WORKS CO.**
Limited

ROAD M



RUSTON STEAM ROLLER



AUSTIN PORTABLE GYRATORY CRUSHER

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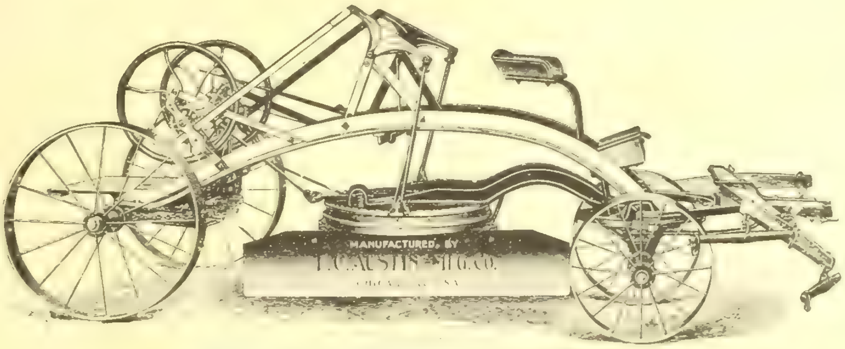

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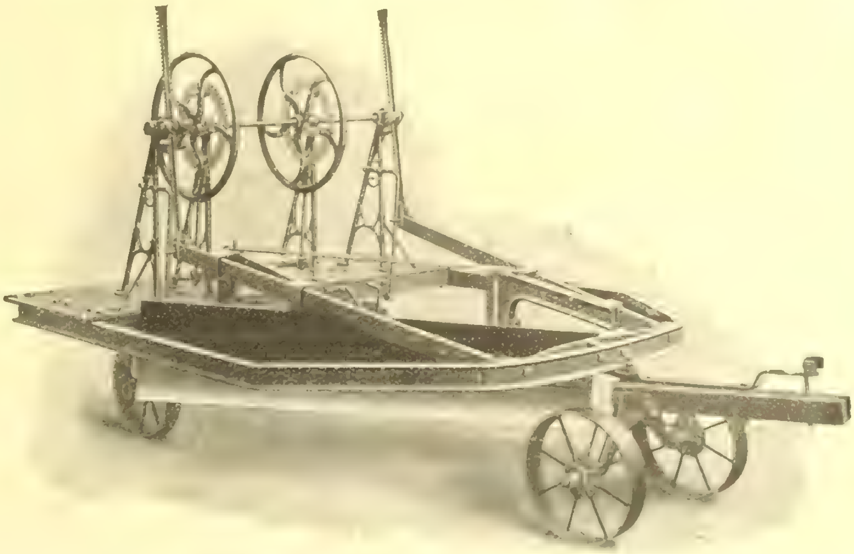

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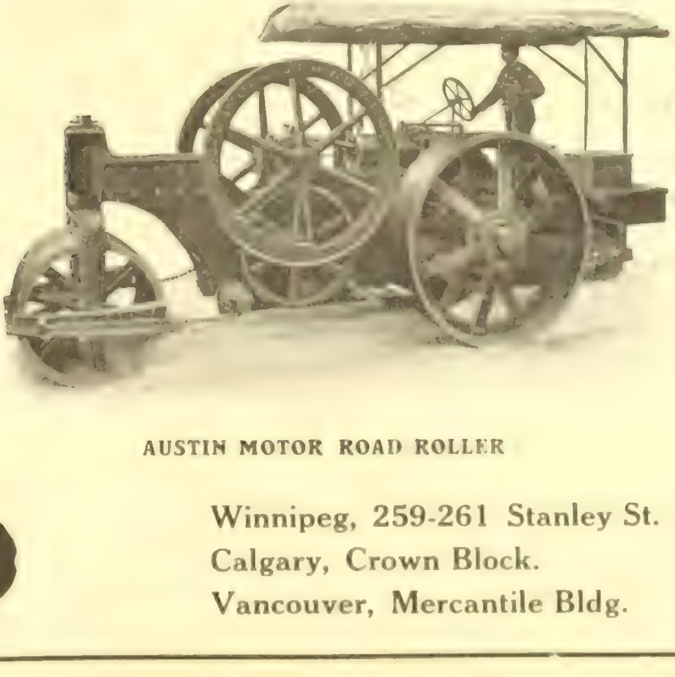

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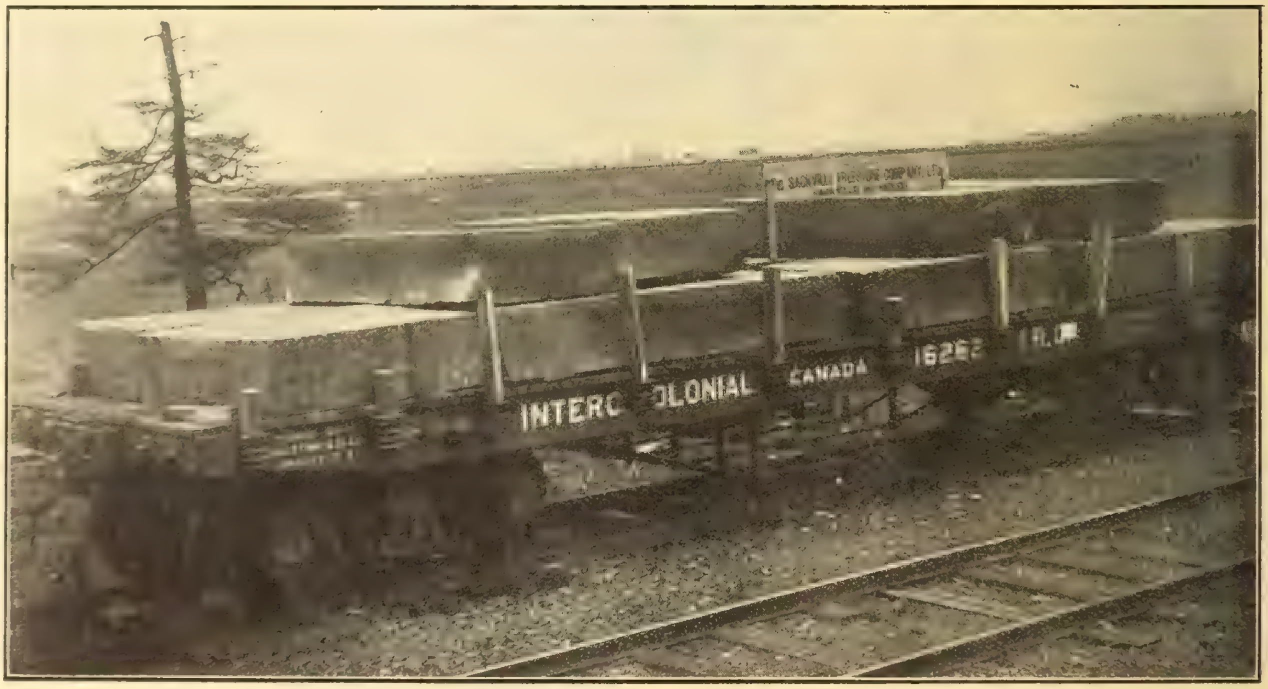

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ESTABLISHED 1886
Contract Record
A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

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Phases of the Tariff Question

While the revised tariff agreement with the United States now under consideration by the Canadian Government is not of particular moment in so far as concerns our building and engineering supply houses, there seems to be a general feeling that the schedule is one which the country can afford to reject; that the prosperity of recent years is a sufficient indication of the success of the old agreement; that in time the United States will come to us in any case, and in short that any change in our fiscal policy at this juncture is not going to help us.

As we have intimated, the changes in so far as this journal is concerned particularly would not be an important consideration. For instance, a reduction of 5 cents a barrel on the duty of cement, from 43 cents to 38 cents, will scarcely make the importation of that article less prohibitive, especially when the question of freight is also taken into account. The brick manufacturers are not affected and no change is scheduled for lime, hard wall plasters, fire brick, etc. A cut of 2½ per cent. on building stone may be overlooked in its effect upon the trade, while a 5 per cent. reduction on vitrified paving blocks will have no far reaching effect. A reduction of 4 per cent. is made in the case of roofing slate, and 2½ per cent. in plate glass. The manufacturers of steamfitters' supplies, paints and oils and a few other lines are not affected.

On looking through the schedule there are a number of items which, to say the least, are amusing. One of these is a cut of 12½ per cent. on Canadian made clocks and watches entering the United States. We wonder whether this is a source of much alarm to the American maker? We were always under the impression that the best watches were made in the old country, a few good ones in the United States and the cheap ones on the continent. Certainly we were not aware that Canada's share in the business amounted to anything. Likewise the apparently heavy concession by the United States in plate glass is a negligible factor, and from the profit made on all the brass band instruments which we shall send out of Canada at a reduction of 22½ per cent., the manufacturers in that line are not likely to devote any considerable portion to philanthropic enterprises, in the way of model roads, public buildings, and so on. We can readily understand that at this juncture anything capable of emitting hot air will have an added value across the border, but for the self-same reason we need those brass band instruments ourselves.

Certainly our own impression is, "Let well alone." Our development during the last decade, to go back no further, has occupied the attention of the whole world, not alone the United States. Our trade has increased beyond the most sanguine predictions, immigration has assumed marvellous proportions, our cities have prospered, the farmers have made money (in spite of their pessimism), and altogether we have every reason to be both gratified and satisfied. Let us do our best for a time at least to keep our trade within the empire, and let us work for any agreement that will enable us, under more favorable conditions, to consign our surplus products to British ports over our own transcontinental railways. We are looking for no concessions from the United States and it is no longer within the power of that country to intimidate us. With our enormous natural wealth we are more than independent. Let us not jeopardize that independence for considerations of temporary advantage.

The Portland cement production in the United States in the year 1910, according to the preliminary estimate made by Mr. E. F. Burchard, of the United States Geological Survey, has set a new high record. His preliminary estimate is based on statistics and estimates received by the Survey from 20 per cent. of the companies manufacturing Portland cement, these companies representing nearly half of the entire output of the country. From these figures he concludes that the production in 1910 was between 73,500,000 and 75,000,000, bbl., as compared with 63,508,471 bbl. produced in 1909. This is an increase of 10,000,000 to 12,500,000 bbl., or 15 to 20 per cent. The figures on which this estimate is based have been received from manufacturers in all parts of the United States, and are therefore considered to be representative of the country at large rather than of any single section or district. Although the average values for 1910 appear, from returns received thus far, to have been slightly higher than in 1909, prices were far from satisfactory, especially to the large manufacturers in the Lehigh Valley district and in certain of the Eastern States. The year 1911 opens with prices cut 5 to 10 cents a barrel lower than those prevailing in 1910. The construction of several new plants has been pushed during the year, and several plants that were under construction in 1909 became producers in 1910, so that the kiln capacity remains far in advance of the demand.

The Province of Quebec has a surplus of nearly a million dollars on the operations of the last fiscal year, according to the report of the Provincial Treasurer, Hon. P. S. G. Mackenzie. The expenditure estimated for 1911 shows an increase of some $600,000 over 1910. Of this increase $175,000 will be devoted to rural roads, making a total grant of $250,000. This is additional to $170,000 for colonization roads. The total amount to be spent on highways and roads in the three departments of agriculture, public works and colonization is $595,000.

The Ontario Good Roads Association

Advance Programme of Proceedings at Forthcoming Convention in Toronto Addresses by Prominent Engineers and Others—March 1-3

From the general interest taken in the work of the Ontario Good Roads Association and from the excellent results obtained by that body in recent years, there is every reason to expect that the annual meeting of the association, which is to be held at the York County Municipal Building, Adelaide street east, Toronto, March 1-3, will be productive of many things of interest to municipal engineers, contractors and others directly or indirectly concerned with good roads. The complete programme for the sessions has not yet been issued, but from the advance copy published hereunder, which of course is subject to revision, it will be seen that every effort is being made to cover all sides of the question and to make the convention as directly helpful as possible, to the practical man as well as to the engineer. The association is negotiating for special railway rates and it is expected that single fares for the return journey will be secured. All those who attend the convention should obtain one-way tickets and secure the usual certificate from the railway ticket agent. Tickets will be good going from Saturday, February 15th, to March 2nd, and returning, March 2nd to March 6th, but must be presented for signature at the Good Roads Convention upon Thursday, March 2.

Mr. W. A. McLean, Provincial Highways Engineer, an Enthusiastic Worker for the Association.

All the proceedings of the convention will be open to the public. For further particulars address either the President, W. H. Pugsley, Richmond Hill, Ont., or the Secretary, Col. J. E. Farewell, Whitby, Ont.

Wednesday, March 1st.— Morning Session, 10.30.

Address of Welcome—G. R. Geary, Mayor of Toronto; R. T. Bull, Warden of York; Controller Ward, Toronto.

President's Address—W. H. Pugsley, Richmond Hill.

Secretary's Report—J. E. Farewell, K.C., Whitby.

"Brief Sketch of the Good Roads Movement in Ontario," J. F. Beam, Black Creek.

Afternoon Session, 2 p.m.

Address—Hon. John Morrissy, Minister of Public Works, New Brunswick.

"Why Toronto voted $100,000 for York Roads," L. H. Clarke, Toronto Board of Trade; W. G. Trethewey, Toronto Board of Trade.

"Good Roads and the Fruit Trade," L. A. Hamilton, Lorne Park.

"The Niagara Boulevard," John H. Jackson, C.E., Superintendent Queen Victoria Park, Niagara Falls.

"Road Management," T. L. Kennedy, Reeve of Toronto Township.

"Road Systems," W. A. McLean, C.E., Provincial Engineer of Highways.

Thursday, March 2nd.—Morning Session, 10 a.m.

"New York State Roads," Geo. C. Diehl, Engineer of Erie County, Buffalo, N.Y.

"Design and Cost of Concrete Bridges," C. R. Wheelock, C.E., Engineer of Peel County, Orangeville.

"Shop Fabrication and Erection of Highway Bridges," L. J. Street, C.E., Toronto.

"Highway Bridges from the Investment Point of View," C. R. Young, C.E.,Toronto.

Afternoon Session, 2 p.m.

Address—Hon. J. O. Reaume, Minister of Public Works.

Address—Geo. H. Gooderham, M.P.P., Toronto.

"Cost of Primary Transportation," R. H. Jupp, County Engineer of Simcoe.

County Road Systems," Herbert J. Bowman, C.E., Waterloo County; T. J. Lammiman, County Road Superintendent, Oxford County; W. R. Cummings, Carleton County; John A. Sanderson, Warden, Leeds and Grenville; Geo. M. Fox, Warden of Wellington County; W. B. Russ, Lincoln County; J. L. Taylor, Wentworth County; and other county representatives.

Friday, March 3rd.—Morning Session, 10 a.m.

Address.—A. McGillivray, Highway Commissioner of Manitoba.

"Township Road Methods," Walter Scott, ex-Reeve of Markham; R. W. Longmore, Reeve of Ernesttown; J. C. Rose, Clerk of Orillia Township; Thos. W. Allan, Reeve of North Grimsby; Wm. B. Bridgman, Reeve of Saltfleet; F. H. Lowery, Reeve of Niagara Township.

Afternoon Session, 2 p.m.

"Tile Drainage of Roads," Charles Talbot, County Engineer, Middlesex.

"Road Drainage and Drainage Laws," F. J. Ure, C.E., Woodstock.

"Roads of Coleman Township," H. I. Routley, C.E., Haileybury.

Reports of Committees.

Election of officers.

The reconstruction of the Radcliffe viaduct of the Great Northern Railway, England, has involved the substitution of a brick structure for the original one of timber without interrupting traffic. The total length ofthe viaduct is about 1,254 feet. The new portion consists of 28 spans, 18 of 24 ft. 11 in. and 10 of 25 ft.

7 in. each. The arches, each five rings in thickness, are divided into five sets and are separated by stop piers 10 ft. in width. The reconstruction work was begun by building three stop piers to the springing level of the arches. A trestle was fixed upon each and wedged against the old viaduct, thus dividing the old structure into five parts; the work was then dealt with in sections between the stop piers. The intermediate piers were carried up to springing level and the centers fixed. The arches were turned in the usual way leaving the piles of the timber viaduct passing through them. When the haunches were filled the weight was transferred to the arches and the tops of the piles sawed off, and the holes which they had occupied filled up. Traffic was carried on one-half of the structure while work was under way on the other.

Master Builders' Convention at Winnipeg

Enterprising Arrangements made for the Fifth Annual Meeting of the C. N. A. B. Reduced Railroad Fares, Papers, Discussions, General Business—February 15, 16.

The annual convention of the Canadian National Association of Builders' Exchanges will be held on February 15-16 in the Assembly Hall of the Builders' Exchange, Winnipeg. The headquarters during the meeting will be at the Clarendon Hotel, Portage avenue. Arrangements have been made with the Grand Trunk Railway for the members of the association to travel under the authorized tariff for club rates. This is a special one-way fare for the return trip, applicable to parties of ten or more travelling from the same point of origin to the same destination. The general programme as prepared by the local committee of arrangements is given below. The association is to be congratulated upon such a business schedule and certainly every member should make a special effort to attend the meeting. To easterners, especially, the occasion should offer an excellent opportunity for visiting the West under very agreeable circumstances and at a very reasonable rate. Mr. J. Herbert Lauer, Eastern Townships Building, Montreal, is general secretary of the C. N. A. B.

Wednesday, February 15.

9.30 a.m.—Delegates and visitors are requested to register at Headquarters, Builders' Exchange, and procure their badges, programmes, etc.

10.00 a.m.—Inaugural Session of the Fifth Annual Convention in the Assembly Hall, Builders' Exchange.

(a) Address of welcome to the delegates by His Worship, Mr. W. Sanford Evans, Mayor of Winnipeg. Response by Mr. E. T. Nesbitt, President of the Canadian National Association of Builders' Exchanges.

(b) Business Session. Call to order.

(c) Address of welcome to the convention, Mr. J. W. Morley, vice-president (Winnipeg).

(d) Response to Address, Mr. Geo. A. Crain, past-president (Ottawa).

(e) Roll call of officers and accredited delegates.

(f) Minutes of the Fourth Convention, London, 1910.

(g) Reports of officers: (1) president; (2) vice-presidents; (3) secretary and treasurer.

(h) Appointment of committees—(1) Resolutions; (2) Legislation.

1.00 p.m.—Civic reception and luncheon at the Royal Alexandra Hotel

2.30 p.m.—Automobile trip "Seeing Winnipeg" to principal places of interest.

8.00 p.m.—Theatre party, drama or vandeville, tendered by the Winnipeg Exchange

Thursday, February 16.

9.30 a.m.—Convening Committee on Resolutions.

10.00 a.m.—Open session of convention. Open to all in the building trades.

(a) "Technical Training," by Mr. T. R. Deacon.

(b) "Ethics of the Master-Builder," by Mr. Geo. W. Murray.

(c) "Contracting from a General Contractor's Standpoint," by Mr. W. A. Irish.

(d) "Impressions and Reminiscences of the Master-Builder," by Mr. P. Mackissock.

(e) "Organization," by Mr. J. W. Morley.

General Debate.

1.00 p.m.—Adjournment.

2.30 p.m.—Open session of convention.

(a) "Reinforced Concrete," by Mr. C. A. P. Turner.

(b) "Architectural Jurisprudence," by Mr. Isaac Campbell, K.C.

Mr. J. H. Lauer, Montreal, General Secretary C. N. A. B.

(c) "Contracting 30 years ago," by Alderman E. Cass.

General Debate.

4.30 p.m.—Convention business session, for delegates only.

(a) Communications and reports.

(b) Prospective legislation.

(c) Ways and means.

(d) Election of officers.

(e) Choice of place of next annual convention, 1912.

(f) New business and good of the convention.

8.00 p.m.—Banquet tendered to delegates at Manitoba Hall, on Portage avenue, by the Winnipeg Builders' Exchange.

The death occurred recently at Sussex, N.B., of Mr. Thomas Heffer, a well-known brick manufacturer. The late Mr. Heffer was in his 88th year.

For Sanding Slippery Sidewalks

An ingenious device has been patented by Chief of Police Gibeau, of Verdun, Que., for sanding slippery sidewalks. Like most useful implements it is extremely simple. A hopper is mounted in the front of a pair of runners. At the bottom is a screen connected with a rod attached to a crank. The crank is in the centre of a live axle which revolves with the spiked wheels at either side of the runners, and thus moves the screen backwards and forwards, sifting the sand close down to the ground in strips of about a foot wide, leaving about three inches between each sanded portion. Being close to the ground no dust flies about as is the case when the ordinary method of throwing sand from a shovel is employed. There is also no waste, as the machine is made the width of the cement sidewalk and just lays the sand or ashes where it is wanted.

The Verdun council thought so highly of the idea when the plans were shown them that they gave the inventor the facilities of their municipal workshop to make a trial machine. It is now working satisfactorily in the town, covering 26 miles of sidewalks in about two days. It requires one man and one horse to operate it and although the ashes from the boiler house have been used in the past, sand is to be used in future on account of its more cleanly properties. One filling of the hopper will at present cover 1⅛ miles of sidewalk, but it is proposed to increase the size. It has been worked out so that when the man starts out to sand the streets he finds a carter waiting with fresh sand at about the point the hopper is empty. Mr. Gibeau has not yet decided whether to sell his rights in the machine or manufacture it himself.

The Architectural Element in Steel Bridges

While it is conceded by most engineers that there is considerable room for improvement in the architectural treatment of steel bridges and that many common types of construction employed in this branch of engineering are obviously incapable of artistic treatment, there are, however, several matters about which, when viewed from an asthetic standpoint, widely varying opinions are held, says The Engineering Record. Authorities generally agree that to produce the most pleasing steel bridge some form of arch must be used, but whether the type should be the plate girder solid rib, the crescent-shaped trussed rib or the trussed rib with parallel chords is still an unsettled question. Evidently the spandrel-braced rib cannot be made beautiful. One great difficulty in constructing these pleasing forms is that appropriation for bridges are generally so small as to exclude consideration of anything more than the mere utilitarian requirements, although there is now a faint demand for more artistic bridges, and it is acknowledged that the community which builds an ugly structure is certainly not making the most of its opportunities.

England and the United States are far behind France and Germany in this matter although something has been done here. The Washington Bridge over the Harlem River in New York and the West Boston Bridge over the Charles Basin in Boston are among the most beautiful structures in the United States. An analysis of them easily reveals the causes of their superiority. The first and greatest is their evident fitness for duty. Unless a bridge is designed to meet this requirement it cannot be an artistic success no matter how much merit it may otherwise possess. It is this that makes the arch so eminently pleasing for long-span bridges. The observer cannot help seeing that a simple arch rib, as in the Washington Bridge, carries the loads downward and outward at the abutments, which is a direct transfer of load that commends itself to the layman. In this respect a truss of the Pratt Howe type is woefully lacking in apparent efficiency, because the loads are carried to the supports along devious paths, first vertically, then diagonally, until, after sufficient repetitions, the abutments are reached.

Symmetry, grace, simplicity and truthfulness are essential elements in a bridge of architectural merit. Truth is a prime requisite, and when a steel bridge or a concrete bridge is tricked out to represent stone the result is a dismal failure. One material must not be made to represent another; each must be used for the purpose and in the manner to which it is peculiarly adapted. It is probable that the two arched bridges above mentioned owe their charm as much to the proper combination of steel and stone as to the graceful lines upon which the steel spans are built. This is also seen in many German structures, where the stone piers and abutments are usually carried upward, at least to the roadway surface, and often even higher so as to form towers or triumphal arches. For an illustration of the effect of this feature, contrast the Washington Bridge in New York or the Eads Bridge in St. Louis with the Fairmount Park Bridge in Philadelphia. In the first two structures the piers extend up to the roadway, while in the last they end just above the water level, far below the roadway. The combination of masonry and steel as employed in the former is very pleasing.

Washing Gravel in Perforated Wheelbarrows

A novel scheme for washing gravel has been in use at Bangor, where construction has been under way for some time on an new mechanical filtration plant, which is being built by the New York Continental Jewel Filtration Company, to replace the existing water purification works. The concrete aggregate is delivered in piles near the work and carried from them to the mixer in wheelbarrows. The gravel contained a certain amount of loam and it was considered necessary to wash it before incorporating it in the concrete. To accomplish this holes were punched in the bottoms and sides of the wheelbarrows, converting them practically into sieves. Between the mixer and the storage piles a water pipe was connected up as shown with a large perforated nozzle at its discharge end. Each wheelbarrow load of gravel on its way to the mixer was rolled under the nozzle and streams of water discharged upon it, the material being churned about with a spade to expose the lower part of the load to the cleansing action of the water. The water and the loam which it flushed out passed out through the perforations in the wheelbarrow and the clean gravel was then carried to the mixer and used.

The new C. P. R. offices to be erected at the corner of King and Yonge streets, Toronto, at a cost of $1,000,000, will have a ground area of 85 feet on King street and 100 feet on Yonge, 8,500 square feet. The building will be sixteen storeys high, or one storey higher than the Traders' Bank building, which is the highest office structure in the British Empire. It will be of steel faced with terra cotta, similar to the material used in the magnificent Standard Bank head office.

Revelstoke Power Plant Nearly Completed

Municipally Operated System—Plans Laid for Future Extension—Diagrams Show Construction Work—Special Design To Prevent Frazil

About fifteen years ago a private company built the present power plant on the Illecillewaet River, about two miles west of the centre of the city of Revelstoke, generating there 125 kilowatt by water, diverted by means of a timber dam at the head of a canyon, down which a square flume was built for a distance of fifteen hundred feet, about half of which was under pressure, terminating in a steel casing in a wooden power house. On one side of this casing was a 500 h.p. Samson turbine designed to operate under a head of thirty-seven feet. The single phase belt-driven generator was next duplicated on the other side of the turbine and later a three-phase machine of 150 k.w. was installed on the same shaft to carry the power load. This plant was bought by the city in 1903.

On account of severe frazil and slush ice conditions peculiar to this turbulent mountain stream, it was decided, about five years ago, to install an auxiliary gas producer plant with a 125 h.p. engine, belt connected to the same shaft as the turbine. The turbine shaft operated at a speed of 275 revolutions, and the engine at 175.

Conditions on River

In the winter slush ice would sometimes block the Illeciliwaet for a distance of three miles to its junction with the Columbia and back into the tailrace, which was connected with the river by a short channel, and about eight feet above low water. The discharge of the river has a very large variation (as far as has been determined to date being estimated as high as forty to one). Owing to landslides and avalanches it is estimated that the discharge has been as high as twelve thousand cubic feet per second for a short time, while its low water flow is estimated to be as low as three hundred. The main line of the Canadian Pacific Railway is built in the north wall of the canyon overlooking the old dam and flume, and any proposed development had to keep the water level at flood at a safe distance below the rails. The scour of water over the old dam had eaten away a large portion of the schistose rock below the dam, undermining the timber apron and carrying away timber crib supports and protection for the flume immediately below the dam.

New Development

In November, 1909, it was decided to construct a new permanent dam at a point about two hundred feet below the old one on a reef in the bottom of the river extending between an overhanging canyon wall on the south and a solid rock point on the north side of the canyon. It was decided to build this dam to a height sufficient to create as large a pool as possible above for handling the frazil ice; to provide sluices to maintain a constant head at a safe distance below the railway, and to connect the power house and old machinery with a new six-foot wooden pipe line replacing the old flume.

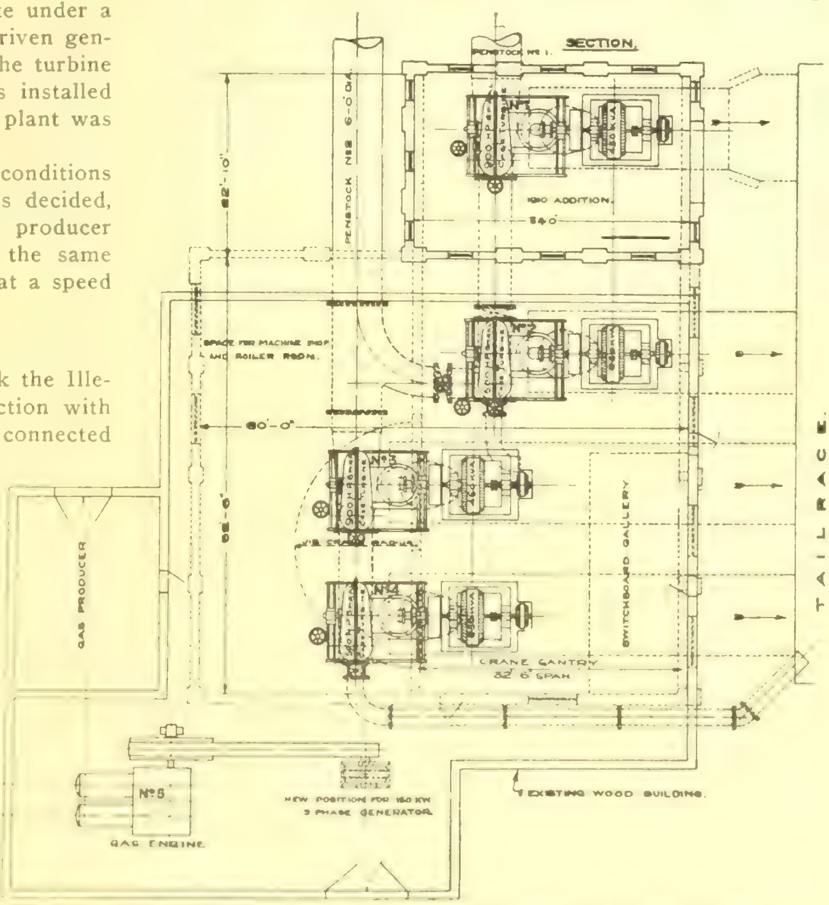
It was later decided to raise enough money at the same time to install a new unit and change from a single phase to three phase current for distribution in the city, remodelling, as far as possible, the distribution system therein.

The accompanying plans show the dam as built with large construction sluiceway, blow-off for handling silt and anchor ice close to the rack bars, with an intake at right angles to the stream provided with two sets of rack bars and provision for steam heating of same in very severe conditions; together with stoplog sluiceway taking the ice raked from the rack bars.

Power House Layout

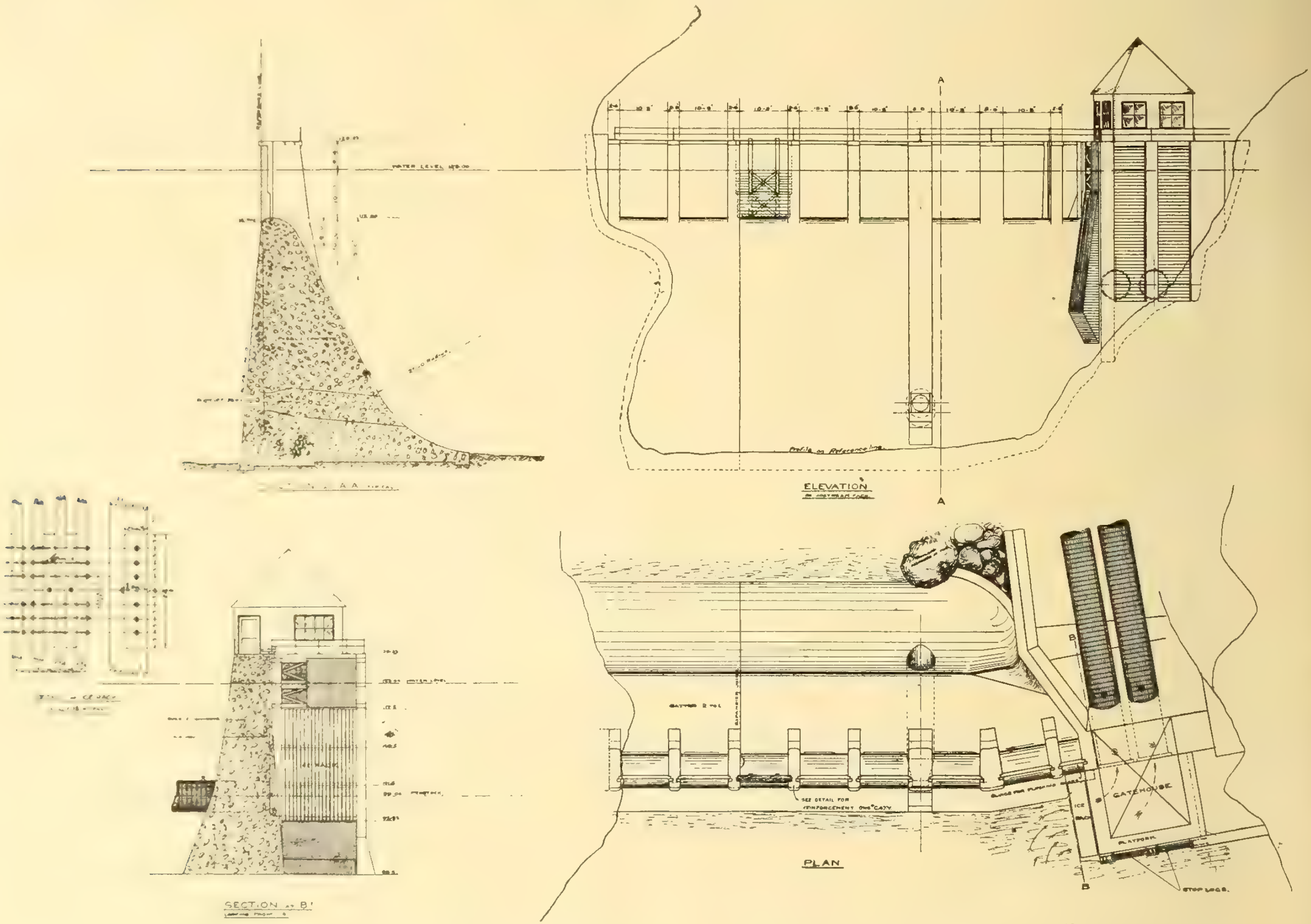
The power house layout was designed to meet existing conditions and allow of gradual replacement of old plant without interfering with operation. The illustration shows the proposed development without any reference to the old plant except that the old power house is shown in full lines. The 1910 addition to the power house is of brick on concrete foundation, and the proposed extensions of this to take in the three additional units are shown in dotted lines. Penstock No. 1 was built to serve units No. 1 and No. 2, and the connections were so constructed that the blow-off at the end of the penstock could be moved when No. 2 was installed, and placed at the end of the penstock, while unit No. 2 will be connected to the penstock and No. 1 by 4 ft. pipe and gate valve.

No. 1 is gated from the penstock by 48" horizontal valve. The old flume enters the power house on the line of penstock No. 2 which will replace it and will serve units No. 3 and No. 4, which will be duplicates of one and two; and will, in addition, have a connection to No. 2. The next step in development will be the addition of penstock No. 2 and completion of unit No. 2 and units No. 3 and No. 4



Showing Present and Ultimate Capacity Revelstoke Power House [illegible] be added when the load increases. The 150 k.w. generator at present operating from the jack shafts from turbine or gas engine will be finally moved and belted direct to the gas engine as shown on plan. No details in regard to switchboard gallery, machine shop and boiler room have been worked out. Unit No. 1 has been built in a separate building and the new switchboard for it placed therein temporarily.

The old plant had a rated capacity of 400 k.w., 250 k.w. of which was single phase and 150 k.w. three phase. The old casing and turbine are still able to operate from the old flume, and a new 250 k.v.a. three-phase machine has been installed on the old foundations to replace the single phase machine, which will now be sold. Unit No. 1 consists of a 900 h.p. single runner spiral casing turbine, manufactured by The Jenckes exciter operating at a speed of 600 r.p.m. This unit was designed to operate under a head of seventy-three feet and carry the full lighting and power load. With overload this would carry the normal increase of the city lighting, and some additional power, for another year or two. The balance of the plant was designed to operate as an auxiliary until the old flume was useless, at which time penstock No. 2 would be built and connected up with a new turbine to 250 k.v.a. unit, which will then complete unit No. 2. The other extensions have already been explained.

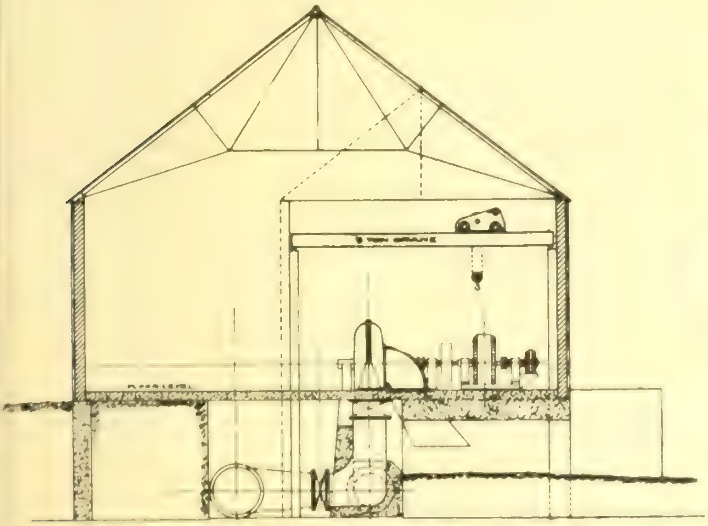


Sectional Plans showing Large Sluiceway, Special Rack Design for Handling Frazil, etc.

Construction of Plant

The construction of the dam in the canyon was interesting and difficult owing to the fact that the work had to be done during low water in the winter time with only limited time for completion, and the difficulties which obtain, due to necessity for keeping the present power plant running and carrying that water and additional water diverted by temporary flume through and over the site of the new dam, while the footings were being excavated and concreted in. Added to this, avalanches above, causing sudden rises and falls for which the stream is noted, and unusually high water during the winter, were a constant menace to the progress of the work. Water was diverted by coffer dam to the south side of the expansion joint and the central part of the dam built up to an elevation of one hundred feet between the expansion joint and the power and diversion flumes. These were built on the slide rock from the railway cutting above, and it was a difficult problem to carry them over the dam site. A concrete cut-off wall under the unwatering flumes was built on the line to the north wall. It was found impossible to complete this portion of the dam further, until the last thing in the spring, after the footings on the south side had been obtained by diverting the water by a second coffer dam into the 8 x 12 sluice above mentioned. Serious delays when this stage of the work had been reached caused grave apprehension that it would not be possible to complete the dam before high water; and it was necessary to carry on the work with this possibility in view so as not to jeopardise the safety of the supply of power for the city until high water had subsided. A short shut down of the power plant was necessary when the power flume was cut, and the footings under the lower rock slide, immediately below the railway track on the down stream side of the dam, were being excavated and concreted. This work it was necessary to push forward in the early spring, night and day. Twice the water rose in the river filling the 8 x 12 sluice and threatening to get beyond control. Finally the new penstocks were built in and the north and south sides raised alternately to the level of the central completed portion. The gate-house was under construction

Concrete Construction Work Revelstoke, B.C.



Present and Ultimate capacity of Power House

when a flood, the result of hot weather, caused a rise of twenty feet in the water against the dam in one day, brought down a large amount of old crib and loosened the old power flume. This driftwood was forced against the incompleted gate-house pier, bending the steel and rendering its completion before the floods doubtful. The water poured over the incompleted dam to a depth of three feet, and it will be remembered that at this time the 8 x 12 sluice was under a head of thirty-five feet, and the large 18" timber-gate, designed to close it and turn the water over the top of the dam, had not yet been placed in the groove which was prepared for it. This was an anxious time for everyone concerned, and when the water subsided on the second day, gradually falling again to within six feet of the top of the sluiceway, it was decided to endeavor to force the bulkhead into place. This was accomplished by loading it with rails and letting it go with a run. It fell to within eighteen inches of the bottom of the opening and the water was successfully turned over the top of the dam. This it had been decided to leave for the summer incomplete, but sufficiently high to take the water through the new penstock, which was then connected with the old flume, and operation under water power again resumed. It was unfortunate that is was found impossible to complete the gate-house at that time, and the gate to the 8 x 12 sluiceway had to be blown out during the next low water period and the gate-house foundations built in the dry. The dam withstood the summer floods, in spite of its incomplete condition and flat crest, showing little sign of wear. The crest and piers have since been added, and it is expected that the gate-house will be completed, the bulkhead again put in place and the full head be put on the dam by the time this article appears.

On account of the location of the 6-ft. wooden stave pipe-line, above the old flume along the foot of the railway embankment, its construction, without interfering with the operation of the old flume, was difficult and expensive. On it there are a number of sharp curves, as shown in the illustration, one of which is less than one in fourteen. The timber in the flume is Douglas fir, kiln-dried, and is of the very best quality. Both it and the sills are painted with preservative coat of asphaltum paint. This part of the work was done by day labor.

The River Banks are of Solid Rock

On the pipe-line are one-way poppet valves, a man-door at the lower end, and a relief valve on the turbine casing just outside of the power house, discharging into the tail-race.

Design of the Dam

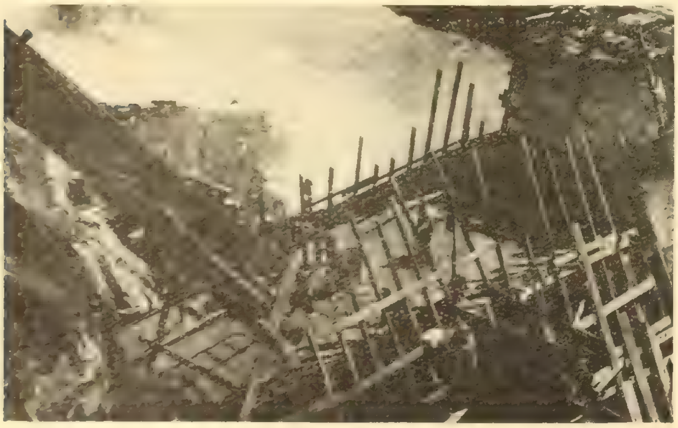
The design of the dam is interesting, in view of its location upon a micaceous schistose rock on the north side, which was seamed with quartzite and very treaherous and faulty, which in the centre of the stream came in contact with a later intrusion of [illegible] diorite. This south wall of the canyon was precipitous, its top overhung the base about twelve feet. The dam was located on the roof connecting the two walls and given the form of an arch abutment by the bend in the dam near the north end. In this way, and taking advantage of the position of the wall on the south side, it was possible to lighten the section of the dam, to take the penstock out at right angles to the abutment and at the same time [illegible]

Construction Work Revelstoke, B. C.

a suitable angle for the rack bars in reference to the current.

The structure was built with the least expenditure possible and to this end the favorable location in reference to gravel and rock and ability to handle these by a compact and overhead traveller, were advantages not often obtained. The Illecillewaet is one of the most difficult streams of the province to handle in flood, due to the immense amount of silt carried in suspension, and the large quantities of logs which come down the canyon. It is intended to handle these latter by booms in the pond above. The most difficult problem in design was to obtain satisfactory sluices at a minimum cost which would satisfactorily permit of quick operation and maintain a constant head during flood. The location of the dam in the canyon so situated in reference to the railway track and with no possibility of enlargement of spillway area, without tunnelling on the south side, had to be met by construction of gates which could be lifted clear—were not too large—and yet would permit of passage of drift through them over the crest. The piers, therefore, had to be made as small as consistent with strength and are heavily reinforced with the best steel obtainable. The full head in low water will not be required for some years, and until that time the sluice-gates will not be installed in all of the openings.

Pipe Line Running parallel with Flume



Construction Work on Dam—Revelstoke, B. C.

The handling of the frazil ice was, as above indicated, one of the chief points in design, and the gate-house with the rack bars will indicate the method adopted. Water is taken in between eight and twenty-five feet below the surface, and the rack bars are situated so as to take advantage of a minimum amount of water to slush the accumulated ice through the 4.5 ft. sluiceway. The blow-off is situated at the foot of the rack bars under a head of forty feet and will handle small amounts of anchor ice and keep them clear of silt.

New 6-foot Penstock on Right

Unit No. 1 is now in operation under a head of sixty feet.

The Government has appointed Mr. H. W. Hodge, of New York, one of the best known engineering experts on the continent, and Mr. M. J. Butler, ex-Deputy Minister of Railways and Canals, and now General Manager of the Rominion Iron & Steel Company, to finally settle the differences of opinion among the board of engineers in charge of the construction of the Quebec bridge. Several designs, involving basic principles of bridge engineering have been under consideration for months past by Messrs. Modjeska, Vautelet and Macdonald, the engineering experts entrusted with the carrying out of the work. They have been unable to agree on some vital questions relating to the plans for the long central span. On the decision of Messrs. Hodge and Butler will depend the solution of problems in which bridge engineers the world over are interested.

Messrs. Geo. Anderson & Co., engineers and ironfounders, of Carnoustie, Scotland, and Montreal, have opened a branch at 504 Builders' Exchange, Winnipeg, for the purpose of looking after their western trade. They have already met with the most encouraging success. The Canadian Manager, Mr. W. Furniss Clarke, has just returned to Montreal with several large orders for cut stone plants, which indicate bright prospects for the firm's specialties. They manufacture the famous Anderson Circular Diamond Saw, gang saws, patent planers, marble machinery, carborundum machinery, rubbing beds, polishers, electric and hand overhead travelling cranes, locomotive cranes, and derricks of all sizes and kinds. They will be glad to meet their western friends in the Winnipeg office, as this branch is intended to deal fully with the western business.

A most prosperous state of affairs was disclosed at the annual meeting of the Canada Paint Company, Limited, held recently in Toronto. The managing director, Mr. Robert Munro, of Montreal, reported that the business of the past year had been a record year as regards the volume of trade. The manufacturing plants in Montreal, Toronto, Winnipeg and St. Malo were all in excellent shape and running to their fullest capacity. Various extensions will continue to be made to keep pace with the continued development, and a heavy trade has already been booked for 1911 shipment.

An Instructive Report on Ties*

Your Committee would beg leave to report as follows: In their report, presented to the Society in January, 1909, it was pointed out that some twelve million ties were being used annually in Canada, which number was being continuously and largely increased, so that probably, within the next 40 years, the consumption will be about one hundred and twenty millions, or equal to the present annual consumption in the United States.

Assuming the following data—average cost of untreated ties at point of shipment at 50c.; freight and putting in track, 15c.; total, 65c.; average life, 8 years. Initial cost of treated tie the same as above; cost of treatment, including extra handling, 25c.; total, 90c.; average life, 16 years. Then, if twelve million untreated ties are being used annually, and their average life is 8 years, there must be about ninety-six millions in use, and the capital necessary to place these ties in the track and provide for their renewal every 8 years, on a 4 per cent. basis, would be $2.41 per tie. The capital necessary to place treated ties in the track and provide for renewal every 16 years would be $1.93 per tie. The total capital necessary:

Ties.

equals 96,000,000×$2.41 equals $231,360,000 for untreated ties.
96,000,000×$1.93 equals $185,280,000 for treated ties.
Total difference in capital..$46,080,000.

$46,000,000 at 4% equals $1,843,200 equals eventual annual saving.

As the cost of untreated ties and the numbers used are increasing very rapidly, and the cost of treatment is likely to be reduced, surely no more need be said to prove the urgent necessity of at once beginning the introduction of treated ties at all points where their capitalized values will show a fair saving on the investment, even if the question is only viewed from the standpoint of economy for the railways.

When the broader view of conserving our supplies, for fear of depletion, is considered, it assumes enormously greater importance.

Preservation Not Considered Sufficiently

Tie preservation by creosoting or otherwise has not hitherto received the attention it deserves in Canada, but it doubtless soon will, as the railway companies are becoming alive to this really vital subject. The American Railway Engineering and Maintenance of Way Association have, however, taken the matter up vigorously, and valuable information can be found in their Proceedings, vol. x, part 1, for 1909, and subsequent volumes. In co-operation with this association, Purdue University made a series of tests to determine whether or not treatment of tie timber had any injurious effect on the strength of the material. The conclusions arrived at, from these tests, are briefly summarized as follows:

(1) No weakness was shown by treated ties, as compared with natural ties, either in rail-breaking or spike-holding strength, except in the case of ties treated with crude oil, and, even with that treatment, the weakening in rail-bearing was of a temporary character.

(2) The average stress under the rail at the elastic limit on the various woods was as follows: Red oak, 1,131 lbs. per square inch; short leaf pine, 642 lbs.; long leaf pine, 690 lbs.; red gum, 830 lbs.

(3) The extremes of atmospheric temperature have an appreciable effect on the strength of wood, especially when green. The warm timber was from 9 per cent. to 17 per cent. weaker than the very cold timber.

(4) The direct pulling resistance of common spikes in the various woods was as follows, in their natural state: Red oak, 7,639 lbs.; short leaf pine, 4,359; long leaf pine, 3,955; red gum, 3,883.

(5) The lateral resistance of common spikes in the various woods was as follows, loads at elastic limit, in lbs.: Red oak, 2,026; red gum, 1,704; long leaf pine, 1,650; short leaf pine, 1,619.

The lateral resistance of screw spikes depends on the diameter and length of shank under the head, elastic limit of the metal, and character of the wood.

(6) The screw spike had from 1.7 to 3.8 times the strength of the common spike against direct pull, and from 1.2 to 2.4 times the strength of the common spike against lateral resistance. The smaller screw spikes gave greater lateral resistance per lb. of weight than the larger spike.

The strength of the common spike against withdrawal is increased when driven to follow a bored hole. The shape of the point of a common spike, however, leads it to drive out of a bored hole, and the resistance to withdrawal is thereby lowered.

A very interesting paper on the economic comparison of railway ties of different materials, written by Neil M. Campbell, appears in the Engineering News of September 22nd, 1910. The results are summed up in a table giving the order of merit of different kinds of wood treated by the three processes, zinc chloride, creosote, and Rueping, as compared with untreated ties, taking into consideration the first cost in the track and the average life.

Strange to say, the first in order of merit is untreated catalpa wood, but, as the writer does not give the value of treated ties of the same wood, this does not prove that it might not be still more valuable if treated.

The second in order of merit is cypress, also untreated, for which a life of 10 years is claimed, and initial cost in track 54c. The same wood, when treated with creosote, comes 19th in order of merit, having a life of 17.5 years and first cost of 95c. When treated by the Rueping process, the order of merit is 6, life 15 years, and cost in track 81c.

Oaks, untreated, come 30th in order of merit, 23rd when treated with zinc chloride, 15th when creosote is used.

Pine, when treated with creosote, comes 3rd in merit, 28th when zinc chloride is used, and 29th when untreated.

Tamarac, treated by the Rueping process, comes 10th in order of merit, but no mention is made of untreated tamarac or cedar.

Different woods require different treatments. The Rueping process is a creosote treatment, and is fully described in the Railway and Engineering Review of October 15th, 1910. It differs from ordinary creosoting in that the timber is first put under air presure sufficient to fill all the wood cells with air. The creosote fluid is then forced in at higher pressure, and the theory is that, after the greater pressure is released, the expansive force of the air throughout the interior of the timber will expel part of the fluid from the cells, leaving the walls of the cells painted with creosote instead of having the cells filled with it.

The cost of treating ties, of course, will vary largely, and will depend, to a great extent, on the numbers treated, the efficiency of the plant, and the nature of the treatment, but the Atchison, Topeka & Santa Fe Railway, who have used the Rueping creosote treatment pretty extensively, report that the cost of treating inferior pine ties is 20 cents.

Mr. Kelley, a member of your committee, reports satisfatcory personal experience with the Burnettizing process at a cost of from 15 to 20 cents.

With regard to size of ties, the 8 ft. length, 6 in. to 7 in. thick, with face from 6 in. to 10 in., is in most general use, but it is somewhat difficult to find any logical reason other than initial cheapness, for adopting an 8 ft. tie for standard gauge track. As this length was adopted, and has been in use for such a long period, it is very easy to understand why the railway companies should hesitate to change, for the transition period would be both troublesome and costly. However, as the weights of rolling stock have more than doubled in the past twenty years, and steel rails have been increased in, roughly, the same proportion, it seems about time to make some corresponding adequate change in tie dimensions.

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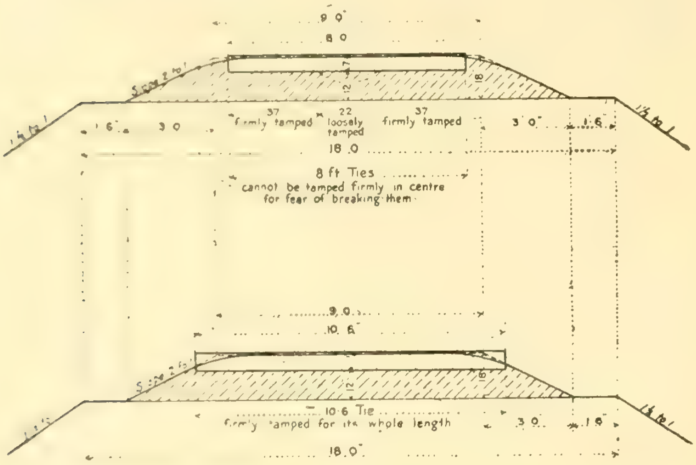
*Extracted from Report of Special Committee of the Canadian Society of Civil Engineers.

It is true that the spacing of ties has been, of late years, made slightly closer, but, while the loads have been increased from 200% to 300%, the base of the superstructure to carry these loads, or the base area of the ties under a rail length, has been increased less than 50%. As there is a practical limit to close spacing of ties, on account of the difficulty of properly tamping them when spaced closer than 20 inch centres, the only resource left is to lengthen them, if more supporting area is required.

The 8 foot tie, not only does not give sufficient support, but it is impossible to utilize its whole length for fear of breaking it, owing to the distribution of the loads on track of standard gauge.

The distance from the end of an 8 foot tie to the outer edge of a 5 inch rail base is about 16 inches, and the best practice is to firmly tamp such ties only 16 inches from the rails each way. The reason for this is that, if fully tamped to the centre of the track, they would give a firmer support, in proportion to the load, at centre than at both ends, and and the ties would break. In other words, you cannot utilize much more than 75 per cent. of the bearing capacity of such a length of tie under a standard gauge track, without destroying the tie itself. In order to utilize the full uniform supporting capacity of the tie for its whole length, it should have the same length from the centre of rail to end of tie, as from former point to centre of track, which would make it 10 ft. 8 in.—say 10 ft. 6 in. long.



It is certain that even the best roads would hesitate to make such a radical change, and, of course, your committee would not presume to say that they should make such a de- that strong logical reasons can be given for the use of ties 10 ft. 6 in. long, and such reasons cannot be given for the parture from long-established practice, but the fact remains use of 8 foot ties.

Ties 7 inches thick, 10 ft. 6 in. long, with 9 in. face, would give about 70 per cent, increased support at an increased cost of only 31 per cent. No increased width of ballast section would be necessary for the longer ties, because no shoulder of ballast would be required at the ends of such ties, so that the actual yardage of ballast required would be slightly decreased by the increased space occupied by the ties. This is fully shown on the accompanying diagram, drawn to scale, illustrating how ties 10 ft. 6 in. long may be used in an ordinary ballast section of 8 ft. ties, without requiring any extra ballast.

Note.—8 foot ties tamped firmly for 16 inches each way from rails only utilize the supporting area of 77 per cent. of tie, equal to 74 inches in length, or 740 square inches for a tie of 10 inch face.

10 ft. 6 in. ties could be used in the same ballast section, firmly tamped for the whole length, giving the maximum supporting area of 1,260 square inches, or equal to 170 per cent. the efficiency of 8 foot ties.

At the present average price of 50c. for 8 ft. ties, they cost about 36 per cent. of cost of 80 lb. rails and fastenings, which would only be increased to 42 per cent. by using the longer ties. The improved condition of track and saving in maintenance of rails and rolling stock would probably soon more than offset the difference in cost of ties.

It has been suggested that longer ties would make drainage more difficult, but, if good ballast is used, there would seem to be no difficulty in that regard, and, if the ballast is inferior, the loose tamping under the centre of 8 foot ties and the shoulder required at the ends of them would form pockets to retard drainage that would be obviated by the use of long ties. Your committee would suggest experimental tests with ties 10 ft. 6 in. long.

The best kinds of wood to use for ties depends upon so many conditions of climate, availability, and cost of timber treated and untreated, that it is very difficult to make definite recommendations.

For general use in our Canadian climate, however, the following woods, if untreated and used with tie-plates, might be recommended, and they are given approximately in their order of merit, having regard to life and initial cost: Cedar, tamarack, oak, yellow pine, hemlock.

For treated ties, used with tie-plates, the order of merit would be about as follows: Yellow pine, tamarac, hemlock, oak.

Rails, Fastenings and Tie Plates*

At the annual meeting two years ago your committee on rails, fastenings, and tie-plates, presented drawings of the various sections of rail used as standard by the railroads of Canada and the United States, and also of some sections which had been proposed and were being placed in service experimentally.

At the last annual meeting your committee reported upon a standard drop testing machine, which received the approval of the society, and which is now in universal use in the mills of both countries.

The experiments with the new sections have not progressed sufficiently for your committee to present a statement of the results in this report, but the use of the new testing machine is proving most satisfactory, and is producing a uniformity of results in the physical tests at the different mills, which is of much value in the collation of statistics.

In considering the subjects for this year's report, it has seemed to your committee, that the next logical step is to consider the service to which a rail is subjected, and the physical qualities requisite for such a rail, leaving for future investigations the consideration of how such physical qualities can be obtained.

With the increasing traffic of railroads, there followed naturally and of necessity an increase in car capacity and of engine weights. From a freight car weighing about 16,000 lbs., with a carrying capacity of 20,000 lbs., there came gradually an increase to cars having a carrying capacity of 40,000 lbs., 60,000 lbs., 80,0000 lbs., and finally 100,000 lbs., with an allowable overload of 10 per cent.

In this transition of car weight and capacity, it is interesting to note, that whereas the cars weighing 16,00 lbs. had a carrying capacity of 125 per cent. of their empty weight, that the cars of to-day carrying 100,000 lbs., with a maximum empty weight of 40,000 lbs., have a carrying capacity of 250 per cent. of their empty weight.

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*Report presented to Canadian Society of Civil Engineers.

Freight cars having originally about 36,000 lbs., upon eight (8) wheels, or 4,500 lbs. per wheel, were superseded gradually by cars having, when overloaded 10 per cent., 150,000 lbs., upon eight (8) wheels, or 18,667 lbs. per wheel. Engines having 12,000 lbs. per driving axle, or 6,000 lbs. per driving wheel, gave place to engines having 50,000 lbs. per axle, or 25,000 lbs. per driving wheel.

The original weight or rails varied from 35 lbs. to 45 lbs. per yard, but with the increasing weight of equipment the change was rapidly made to 56 lbs., 60 lbs., 65 lbs., 72 lbs., and finally to as high as 100 lbs. per yard.

The effects of these heavy loads upon track having been investigated both theoretically by mathematical analysis and practically by carefully conducted tests upon the rail and track, under actual train movements.

Allowing 100 per cent. for the impact of rapidly moving trains over the standard track in use in this country, with engine axle loading of 50,000 lbs., we obtain the following, in which the third column would probably be more nearly the correct one theoretically, provided the stresses were due to the effect of the assumed load only.

FIBRE STRESS PER SQUARE INCH (TENSION)

Weight of Rail per yard	Between 3 ties as a continuous girder having stable supports.	Between 3 ties as a continuous girder having an unstable centre support.
60 lbs.	24,878 lbs.	28,000 lbs.
80 lbs.	16,668 lbs.	18,750 lbs.
100 lbs.	11,417 lbs.	12,842 lbs.

The stresses shown in column 3 do not reflect accurately the actual condition to which a rail may be subjected, for there is a reversion of stress of tension to compression like the swing of a pendulum under the passage of every wheel.

In addition, the rail is subjected to a continual series of shocks, due to imperfect counter-balancing of engines, flat spots on wheels, irregularity of track surface, the oscillation and jar of equipment, the tension due to contraction in a falling temperature, and the effect of the tractive force of the engines.

To determine the actual effect upon rails by passing trains, a series of careful experiments were conducted on the New York Central and Hudson River Railroad, with a delicate automatic recording machine, by which the actual deformation of the rail could be measured for each passing wheel of a train, and the actual stresses in the rail determined.

These investigations demonstrated that at speeds of 30 to 40 miles per hour, engines having about 20,000 lbs. upon a driving wheel would produce tension stresses in the bottom flange of 80 lb. rails somewhere in excess of that shown in the third column of the preceding table, but well within the safe allowable limits of unit stress for good rail steel.

Experiments upon joints have also shown that a tensile stress of 12,000 lbs. per square inch could be produced in the unloaded rail due to its construction in a falling temperature, before the grip of the angle bars would permit the rail to slip and relieve itself.

An accumulation of these varied stresses in the lighter sections of rail, might therefore bring the total stress up close to the "Elastic Limit" or "Yield Point" of some of the rail steel.

The question has sometimes been asked, has the weight of the rail section increased as rapidly as the wheel loading? To this may be answered, Yes! In the days when a 60 lb. rail section was a common standard, an engine axle loading of 24,000 lbs. was not infrequent; this loading produced a tension in the rail under the conditions of column 3 of the table of 13,440 lbs. per square inch, as compared with 12,842 lbs. per square inch for a 100 lb. rail, under an axle loading of 50,000 lbs.

From a study of the preceding conditions it is evident that certain physical characteristics must be secured, in a steel rail, to meet the requirements of modern transportation necessities; briefly these may be recalled as follows:

(1) The steel must be sound and free from physical defects.

(2) It must be sufficiently hard to resist abrasion reasonably and also deformation of section.

(3) It must be of uniform texture, but not brittle.

(4) It must have a high limit of elasticity and ultimate tensile strength.

The question naturally arises, can such a rail steel be produced? The answer is, that it has been produced in the past, that it is produced to-day, although not uniformly, and therefore, that it should be produced uniformly in the future.

How to produce a rail steel uniformly possessing such qualities, and how to identify positively when such a steel has been produced, is a work, first, for the manufacturers, and second, for the manufacturers and users of rail jointly, and this knowledge must be the basis of a satisfactory specification in the future.

That such a result can be reached is earnestly to be hoped, but it will require the co-operation and serious endeavor of both interests to accomplish this most desired and necessary result.

The City of Montreal is considering its estimates for the coming season. It is proposed to make a grant of $1,500,000 to the road department and $1,000,000 for sewer construction. This is exclusive of $700,000 to be spent solely in the new wards, and also exclusive of the permanent works to be executed in virtue of special loans, viz., the enlargement of the aqueduct, the building of underground conduits and other permanent works.

Mr. Wm. C. Mitchell, formerly superintendent of the Dominion Steel Company, has opened an office in the Canadian Express Building, Montreal, as a consulting engineer. Mr. Mitchell has had extended experience both in America and Europe, and should be well qualified to undertake the design of modern iron and steel plants, as well as to effect economies in existing plants.

A recent visitor to Montreal was Mr. Wm. Beardmore, of the Clyde shipbuilding firm of that name. Mr. Beardmore has come to Canada to look over the situation in regard to Canadian naval construction.

Mr. J. T. Brower, of the Structural Steel Company, Longue Point, Que., has been appointed general manager of the National Bridge Company, Montreal, and will enter upon his duties on March 1st.

Mayor Frazer, of New Glasgow, N.S., was in Montreal recently in connection with the new waterworks system which is being installed in New Glasgow.

Mr. N. R. Darrach, architect, St. Thomas, Ont., returned to that city last week from a combined business and pleasure trip to Regina, Sask.

City Engineer [illegible] of Westmount has left for an extended tour through the United States where he will make a study of good roads.

Notes on the Design of Retaining Walls

Fundamental Principles and their Application—The Avoidance of Excessive Theoretical Calculations – Defects in Prevailing Methods — Cases in Point

By Edward Godfrey*

etaining walls, like dams, were among the most ancient of engineering necessities. Like dams they are among the most recent to be accorded critical attention in the matter of their design. The design of dams is in such a primitive state that in all the works on dams, so far as the writer can discover, there is not one word concerning the upward pressure of water that may, and as a rule does, work its way into horizontal joints and under the base of the dam—the force that has been the cause of practically all the great failures of masonry dams. The great Austin dam failure was discovered to be due to this eight years after the failure. Colleges are beginning to mention it in their courses after agitation by the writer begun in 1904.

The destructive force that is almost neglected in the case of retaining walls is the effect of frost. Much has been done in the way of working out elaborate formulas for the supposed pressure of earth against the back of a retaining wall. The exact direction and point of application of the forces acting on the back of a wall can be very nicely determined—theoretically. When the real wall is constructed, sometimes the earth will stand vertically with little or no sharing, while the masonry is being put up, this in spite of possible thousands of tons of horizontal force which (on paper) is being exerted.

Of course there is or may be horizontal force exerted against the back of a retaining wall. The writer would not belittle calculations, per se, of the force to arrive at a basis for proportioning the wall. But when the theory of pressures is founded wholly on assumptions which may at times be erroneous to the extent of the infinite ratio of a finite quantity to zero, the case is one where simplicity is more in keeping with fact than elaborate formulas.

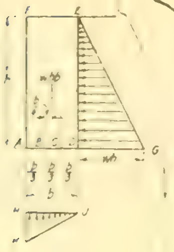

Fig. 1

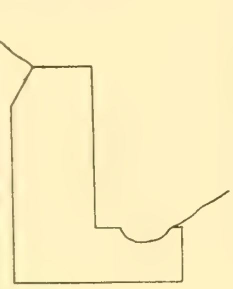

Fig. 2.

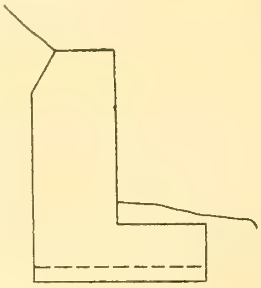

Fig. 3.

Before the real nature of the planets was discovered, supposed scientists worked out intricate rules to describe the paths of the planets among the stars. There is a great deal of mathematical junk in engineering books that is of no more use to any one than those rules would be to a modern astronomer.

When men want to know at what slope earth may safely lie and not be beaten down by storms and the changes of temperature, they do not take a lump of mud and let it slide down a mud incline to get the coefficient of friction and from this to find the angle of repose. This might be done in such regular and uniform materials as dry sand or grain. But vastly more reliable data are obtained by observation on embankments that have stood the weather or have perhaps been subjected to the partial leveling that nature demands before she will permit them to remain stable and undisturbed.

In the simple matter of the brick walls and windows of a building, if their capability to resist a wind pressure of 40 or 50 lbs. per square foot were a test of their ability to stand, but few would remain standing. Here, too, experience has been the prime factor in determining the proportions.

Many structures admit of exact calculations and exact theories for their stresses are in place, but retaining walls are not among these. Safe proportions for a retaining wall may be arrived at in a manner somewhat similar to the derivation of the rule for the slope of embankments; that is, by observing the proportions of walls that have remained stable. Empirical rules based on such observations point to the fact that if a solid masonry wall has a height about three times as great as its thickness, it will retain ordinary earth with complete stability. The design of a retaining wall would then seem to be a simple matter for such cases, merely the making of a wall of a thickness one-third of its height. But there are other features that must be taken care of, and these are of equal importance with the thickness of the wall.

In order to arrive at a basis for determining the stability of a retaining wall of other than the rectangular shape and avoiding the excessive theoretical calculations so often made use of, it will be assumed that a masonry wall of rectangular cross section and having a height three times its thickness is stable against the pressure of ordinary earth or fill. A fluid pressure will be assumed on the back of the wall, and friction of the fill against the back of the wall will be ignored. For stability the resultant pressure on the base must fall within the middle third. If it falls at B (Fig. 1), the edge of this middle third, there will be no uplift on the base. The shaded triangle H J K will represent the pressure on the soil. Moments around B should then balance; that is, the moment of the weight of the wall will balance the moment of the horizontal force of the backing. For a foot of length of wall, if W equal the weight per cubic foot of the masonry and w the equivalent fluid weight per cubic foot, we have: $W h b \times \frac{b}{6} = w h \times \frac{h}{2} \times \frac{h}{3}$, or if $h = 3b$, $W = 9w$.

If then the weight of masonry be 150 lbs. per cubic foot and the weight of earth fill be 100 lbs. per cubic foot, the equivalent fluid weight is 16 2/3 lbs. per cubic foot, or one-sixth of the weight of the fill. It is very much simpler to consider the pressure of the fill as a fluid pressure of say one-sixth or one-fifth of the weight of fill per cubic foot than to use the intricate formula for earth pressure which fail so conspicuously to justify their existence.

A retaining wall of any considerable size is a heavy structure, and heavy structures demand special provision against settlement. Settlement in a retaining wall is tantamount to failure, because it is invariably unequal settlement, disturbing the perpendicularity of the wall, destroying its alinement, and giving rise to cracks. In other structures such as buildings, settlement may take place without serious consequences if that settlement be small, provided the design has been made with a view of making the settlement uniform. This latter can readily be done by the simple expedient of making the areas of the footings proportional to the load. In a retaining wall the greatest pressure will be under the outer edge of the wall; settlement here means that the wall will lean outward. It is also true that the smallest resistance of the soil against pressure is at this same outer edge, since soil will resist very much less pressure near its surface than at a point some distance below the surface. Furthermore, the conditions in a retaining wall are unfavorable in the matter of the softening of the ground by the action of the rain at the very place where such softening has the most harmful effect. Ground water at the base of a retaining wall will soften the soil and make it more yielding. Sometimes in railroad work there is even a gutter at the base of a retaining wall. These conditions do not exist in a building where the cellar is kept dry and the surface of the soil that is nearest to the level of the footings of walls does not undergo this softening action.

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* In Engineering—Contracting.

One way that would suggest itself to overcome the difficulty would be to build the retaining wall deeper. This not only adds largely to the expense but increases the soil pressure, thus defeating to some extent its own end. Another way is to drive piles under the wall near the outer edge of the same, so as to increase the bearing power of the soil at this critical locality. This would no doubt be an excellent and economical method of insuring the stability of a retaining wall in many cases.

Still another method is to use a wide slab for a footing under the wall, as indicated in Figs. 2 and 3. In stone work flags would have to be used. In mass concrete, of course, a concrete slab would be used. A little steel reinforcement would add greatly to the efficiency of the slab. In railroad work the same slab might be made to act at a gutter, carrying the water away that might otherwise act to soften the soil at the base of the wall.

It is seen from Figs. 2 and 3 that by anchoring the wall into the slab at the back, the stability against overturning would be very greatly increased. This cannot well be done in ordinary masonry, but in concrete it could very readily be accomplished.

It is further seen that if the slab projected under the soil at the back of the wall still more stability would result by reason of the fact that the slab would be loaded with a large weight of superimposed earth. A T or L shape is then a logical shape for a retaining wall. Such shapes are not possible in ordinary masonry; that is, they would not have the required strength. In reinforced concrete, however, they are both practicable and economical. The projection at the front of the wall does not need to be very large, except where the soil is particularly soft. At the back the projection should be a large fraction of the height in order to take hold of sufficient earth to give the required stability. The wall will then be L shaped in cross section.

A simple L shape of uniform cross section in a retaining wall would mean that the base slab and the vertical wall would have to act as cantilevers. Cantilever slabs are not economical, and they are difficult to reinforce. Two cantilever slabs meeting at right angles would be specially troublesome to reinforce because of the difficulty of carrying stresses around the corner.

Figure 4 shows a suggested form for an L-shaped wall. Three series of reinforcing rods are used. Rods a b would reinforce the cantilever whose critical section is X X. Rods e f would reinforce the cantilever whose critical section is Z Z. Rods c d are needed to reinforce the corner. The section Y Y could here be used as the critical section. If a single curved rod were used in place of these three from a around to e, the tendency, when this is under tension, would be for the rod to pull out and break off the overlying concrete. Each rod can in this arrangement run beyond the points A and B far enough to get the full anchorage value, say 50 diameters. Rods e f can further be curved down as indicated to reinforce the projection at the heel of the wall.

In order to make the two slabs of an L-shaped retaining wall act as simple beams and not as cantilevers these slabs may be joined by ribs or counterforts at intervals in which rods are embedded. An oblique projection of such a wall is shown in Fig. 5, viewed from the rear.

It is an absurdly simple proposition that the rods in the counterfort or rib act merely to tie together the horizontal slab and the vertical slab. The vertical slab is subject to horizontal pressue from the earth back of it. The rods in the ribs resist that pressure, and in order to have something against which to pull they must be anchored down into the horizontal slab, which is able to resist the pull by reason of the weight of earth upon it. In spite of the simplicity of this proposition this three-cornered counterfort is analyzed in books as a beam. Besides this, in nearly all the walls built on this plan rods are thrown in in a most senseless and wasteful manner. In one example of a wall 45 ft. high there are nearly 100 horizontal rods varying from 3/8 to 1 in. square, besides 22 rods 1¼ inches square placed diagonally close to the back, all of this in a single counterfort. In this structure there are tons of steel positively wasted. In other examples there are meshes of horizontal and vertical and diagonal rods that cannot possibly be good for more than a small fraction of their tensile strength.

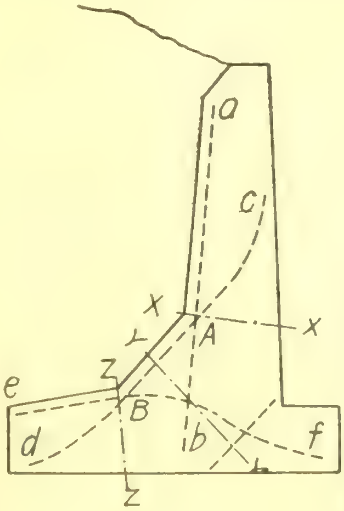

Fig. 4.

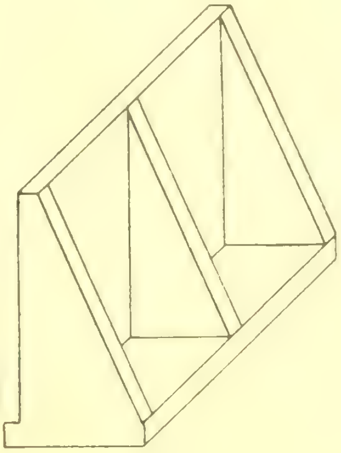

Fig. 5.

Figure 6 shows the two ways in which one of these retaining walls could fail. The real strength of all this mass of steel rods is merely the little anchorage value of the short ends that are embedded in the vertical and the horizontal slabs. It is a cardinal principle of good design in reinforred concrete that a short end of a rod is entirely inadequate to anchor it for its full value.

Another glaring fault in the common method of design, illustrated in Fig. 6, lies in the useless intermeshing of the rods. A single curved rod running from the horizontal to the vertical slab and anchored in each would perform all and more than all the duty that a horizontal and a vertical rod, as shown in Fig. 6, can perform. The long rods A and B are absolutely useless for the greater part of their length. A single short rod from A around to B, with end anchorage at A and B, would be far more effectual than these two rods combined.

Another serious fault in this common design lies in the difficulties and uncertainties in the matter of execution. A mesh of rods in any event is a serious menace to the proper placing of concrete. A little misplacement of a rod whose short end is depended upon for anchorage could result in the rod being nearly useless. This could very readily be committed, even under the eye of a watcher, where such a large number is called for. It would be extremely difficult to hold such rods in place during the pouring of concrete and to be sure that none of them have been dislodged in the operation.

The writer has devised and patented a scheme for reinforcing a retaining wall such as that shown in Fig. 5 that obviates all of these difficulties. The design is shown in Fig. 7. It is to be noted that the rods in the ribs, instead of being indiscriminately placed in horizontal and vertical positions, are all placed diagonally. Each rod has an easy curve near the end and is anchored for its full value in both the horizontal and the vertical slab. The office of the rib is here recognized as being merely to protect these rods from corrosion. It is not a beam in any sense and should not be filled with a useless lot of shear rods.

The anchorage for the rods in the design shown is an angle through which the rods pass. The rods have a nut on each side of the metal to hold them in place and in bearing against the metal. The same angle has holes in the other flange through which the rods pass that are used to reinforce the slabs. For a wall of this sort to fail this anchoring angle would have to be torn out, and it would pull with it the slab reinforcement. Besides being designed for the actual stresses in the wall and amply capable of resisting them, this reinforcement has many practical advantages.

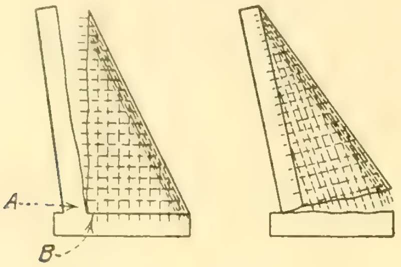

Fig. 6.

There is no mesh of rods in the rib to interfere with the flow of concrete. The rods are parallel and almost in the direction of the flow of concrete; they are further in only one plane.

The entire harp-like reinforcement of a rib can be put together on the ground and raised to place as one piece. A few braces will hold the whole in place, and interference with placing the concrete is for this reason also reduced to a minimum.

The small number of rods makes omission of any of them noticeable. Furthermore, such omission would show up in vacant holes in the angles and could readily be detected.

It is almost impossible for any of the rods to be displaced during the pouring of the concrete.

The writer has devised a standard retaining wall with proportions and reinforcement as shown in Fig. 7. The several features will be taken up in order. It will be noted that the height of the wall is 2.4 times the base. It was found by trial using three walls having bases 5, 10, and 15 ft. respectively, and heights 12, 24, and 36 ft. respectively, earth at 100 lbs. per cubic foot and concrete at 150 lbs., that walls of the dimensions shown in Fig. 7 would be stable against a horizontal fluid pressure of about 18 lbs. The stability of these walls would then be equivalent from this standpoint to that of walls of solid concrete having three times their thickness. Furthermore, the stability of the reinforced concrete retaining wall is based on the assumption that there is a plane of cleavage vertically over the back edge of the slab, as only the weight of earth directly above the slab is considered. If the wall should turn over, it would have to lift more than this portion of the backing, so that the reinforced wall has this extra element of stability.

The volumes per bay for the three walls referred to (12, 24, and 36 ft. in height) were found to be 96.6, 452.8, and 1,168.5 cubic feet respectively. Solid masonry walls of the same height and having bases one-third the height would contain 3.73, 3.39, and 3.14 times as much in volume of masonry, respectively, as the reinforced concrete walls.

The centers of gravity of these three walls were found to be 1.43 ft., 3 ft., and 4.66 ft. respectively, from the heel of wall. The respective volumes of earth over the slab are 332.3, 1,377.2, and 3,206.3 cubic feet. The centers of gravity of these volumes are located at 2.96 ft., 5.97 ft., and 9.01 ft., respectively, from the heel of wall.

One peculiarity respecting these three walls is that the resultant center of gravity of earth and concrete is in each case almost exactly in the center of the slab. This makes it proper to assume that the pressure due to the weight is uniformly distributed over the base, as shown at a, Fig. 7, as the stiffness of the bottom slab is sufficient to give this distribution. The reaction of the earth under the slab will be uniformly varying from zero intensity at the toe of the wall to double the intensity of the uniform load at the heel of the wall, as at b. The difference between these sets of forces shown at c must be resisted by internal stresses in the concrete. On the left half of the bottom slab the forces are seen to be upward. If the construction were a reinforced slab, it would require the principal reinforcement in the upper part. For simplicity of construction it is desirable to avoid this. The close proximity of the vertical wall makes it possible to throw this force directly into the wall by means of the steps at the junction of wall and slab. These steps could of course be replaced by a chamfer or slope, if the latter were found to be simpler of construction.

On the right half of the bottom slab there is a vertical load downward varying in intensity from zero at the middle to an amount at the edge of the slab which may be taken as the weight of superimposed earth and of the slab itself. This is close to 250 × b lbs. per square foot. Taking the effective span of the slab as 7½ feet the bending moment on the extreme right edge is 250 b × 7½ × 7½ divided by 8 equals 1,758 b. This is in foot pounds per foot width of slab.

In order to give clearance for the angles shown in Fig. 7, the steel rods are placed one-sixth of the depth of the slab from the bottom. Following the method employed by the writer in his book, "Concrete," the effective depth of the slab is found to be two-thirds of its depth out to out. As this latter is 3/20 b, the effective depth (that is, the distance

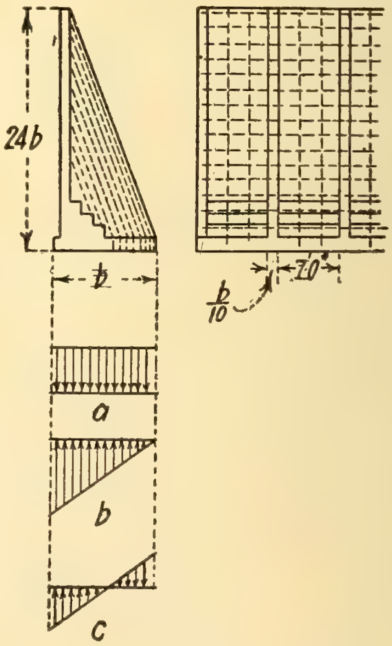

Fig. 7.

from the center of steel to center of compression in concrete) is 1/10 b. For an area of steel equals A, in square inches per foot width of slab and a stress of 12,500 lbs. per square inch we have an allowed bending moment of 12,500 A × 1/10 b equals 1,250 A b ft. lbs.

Equating this to 1,758 b, found above, we have: A .. 1,406.

This can be made up of four ⅝-in. diameter rods. It is thus seen that for any size of retaining wall ⅝-in. round rods, spaced 3 inches apart, will take the tensile stress in the bottom slab at the extreme right edge. The spacing of rods can be increased toward the middle of the slab. It is better to increase the spacing than to use varying sizes of rods, as the ordering of material is simplified. An arbitrary maximum spacing of 12 inches is used here for the left half of the slab to tie the concrete together.

To prevent cracking of the slab due to deflection upper rods are added, as shown in Fig. 7. These are made 5 ft. long and spaced 6 inches apart, thus making their area one-half of the maximum bottom reinforcement. It is the writer's practice to design slabs as simple beams, using the clear span, and to reinforce across the support with one-half of the area required in the slab, so as to prevent cracks and consequent weakening of the slab in shear. Note that the clear span here is not the clear distance between ribs, since the steel angle F and not the rib supports the slab.

As the writer has shown in his book, "Concrete," when the area of steel does not exceed 1¼ per cent. of that of the concrete in a slab the stress in the concrete will be within safe limits. It is seen that the area A, found above, is 1¼ per cent. of that of a slab 12 inches wide and 9.4 inches deep. For a base of 5 feet the depth of slab is 9 inches; hence a lower limit of about 5 feet should be adhered to for this standard. For smaller walls the thickness of parts for a wall of 5-ft. base could be maintained and the span between ribs varied to suit the bending moment found. Thus for a wall having 2½-ft. base (one-half of the standard 5-ft. wall), the load on the slab will be approximately one-half of that on the 5-ft. wall. (The height of this wall would be 6 ft.) A 9-in. wall with the standard reinforcement will be good for a span V2 times the standard, or 10.6 ft., say 10 ft. clear.

The span of 7 ft. in the standard wall is found as follows: Let s .. clear span in feet. The end shear in 1 ft. width of slab is 250×½ s equals 125 b s. The shearing strength of a slab 3/20 b feet deep and 1 ft. wide, at 40 lbs. per square inch on the gross area is 3/20 b × 12 × 12 × 40 equals 864 b.

Then from the equation 125 b s .. 864 b, we find s .. 9.91 ft.

Since this remains true for all sizes of standard walls, it is seen that the shear is taken care of in all walls. In walls of less than 5 feet in base, and having a thickness of slab equal to the 5-ft. standard, shear will also be taken care of, since the slab will have a greater relative depth than in the standard wall.

The reinforcement in the front walls is found as follows: It will be seen in the standard retaining wall that the depth from top of wall to top of steps is 1.9 b. The intensity of horizontal pressure is therefore 1.9 b × 1/6 × 100 lbs. square foot. This gives a moment on a foot depth of wall .. 223 b ft. lbs. The moment of resistance of the reinforced slab, found as above, is 12,500 A ×

From 223 b equals 883 A b, we have A equals 267 sq. in.

This would be made up by one ⅝-in. round rod for every foot of depth of wall. This reinforcement is carried up to the top of the wall and is used as indicated on the lower portion of the wall and on the bottom, though theoretically less reinforcement would be required. The purpose is to tie the wall together. Near the top of wall this extra reinforcement is especially useful in resisting local effects of frost in the ground, which are more intense near the surface. Extraneous load on the backing would also effect the wall the greatest near the surface.

It is well to chamfer off the inner edge of a retaining wall at the top, as indicated in Figs. 2, 3, and 4, so that the effect of the expansion of surface ice will be deflected.

The rods in the rib take the downward force shown at c, Fig. 7, the amount of which at the right edge is at a rate per foot close to 250 b × 7 equals 1,750 b lbs. On a retaining wall of 5-ft. base the load in a foot is 8,750 lbs. At 12,500 lbs. per sq. in. this would require four rods ½ in. in diameter. For a 10-ft. base four 11-16-in. round rods are required, etc. By giving these rods the same horizontal spacing at the bottom as those in the bottom slab and varying the rate of spacing in the same manner, the vertical load is taken care of. The rods start vertical and hence the vertical load measures thei rstress and not the component in the diagonal direction. Of course straight rods could be used, by employing beveled washers, in which case the stress would be the diagonal components of the vertical load.

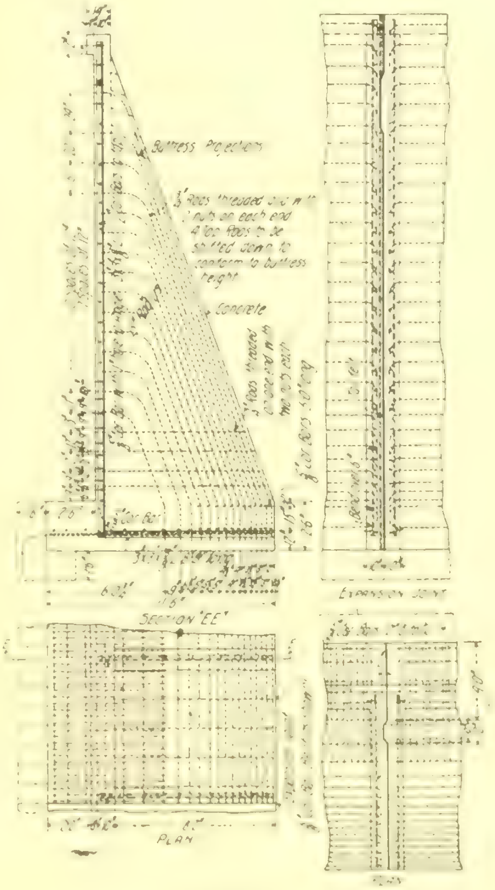

Fig. 8.

The horizontal force against the vertical wall is less than the weight of earth on the slab which is carried by the rods in the counterfort, hence the same rods will be sufficient to resist the horizontal force on this wall.

The work of the steps at the junction of vertical wall and slab is to resist an upward pressure varying from zero at the foot of the steps to a maximum under the vertical wall. Reinforcement is not needed in these steps because of their [illegible] and because they are supported on three sides.

The projection at the heel of wall does not need reinforcement, because its amount is only one-third of the depth. If a large projection were needed here on account of soft soil in the foundation, reinforcement should be used.

Washers that take the full stress of rods should have their area about [illegible] times the section of the rod. This will dition would govern the size of the flange of angle to which rods in the rib connect. These angles could vary from about 2½ x 2½ x 5/16 in. for small sized walls to 4 x 3 x 3/8 in. for large walls.

The rods in the ribs should be bent with easy curves and not with sharp bends. Sharp bends are totally out of place in rods reinforcing concrete. The radius of the curve of bend should be about 20 times the diameter of the rod.

A retaining wall built on this or any other plan should have the backing well drained. This plan admits of ample provision for drainage by means of weep holes through the slabs. In order that these do not fill with mud, some loose stone should be laid around them.

In a wall built after this plan at Melwood Ave., Pittsburg, the bottom slab was inclined. This made a pocket, into which drainage could be carried. The maximum height is 64 feet. The anchoring pieces are ⅝-in. plates instead of angles. Plates do not afford a ledge or shelf for the concrete slab to rest upon, but in this case this was offset by the fact that the reinforcing rods for the slabs were curved in an arc. However, these rods, where they entered the ⅝-in. plate, were bent normal to the plate. This makes the anchoring value of the plate to depend largely upon shear in these rods. Of course adhesion to the side of the ⅝-in. plate will help to anchor the plate, but adhesion of concrete to a flat surface is not of very great value, because the element of grip is lacking.

The rods in these ribs may vary from 1¼ in. to 1⅝ in. They have forked loops at the ends and turnbuckles for adjustment. They are connected to the anchor plates by means of cotter pins. The front wall is 18 inches thick, the bottom slab is 2 feet thick, and the rods are 1 foot thick. The spacing of ribs is 10 feet and the maximum width of bottom slab is 29 feet 6 inches. At the highest portion of the wall there is about 2,400 cubic feet of concrete per bay. A solid wall 64 feet high and having a base one-third of the height would have nearly six times this amount of concrete in 10 feet of its length. The economy of this form of retaining wall is therefore manifest.

The accompanying plans, Fig. 8, which were kindly furnished the writer by L. W. Anderson, city engineer, of Grand Rapids, Mich., show part of some extensive flood protection work constructed in Grand Rapids. The writer's design of retaining wall was used in this work. The anchors for the rods in this work consisted of angles, as used in the writer's standard plan. Mr. Anderson states: "There has been no difficulty in rapidly placing the counter for reinforcement as a whole, setting and plumbing the same. The rods are quickly and accurately placed by common help with very little attention on the part of the inspector. Every rod has its proper location, and there is very small chance of rods being misplaced or omitted."

Montreal Builders' Exchange Annual Meeting

There was a good attendance at the 13th annual meeting of the Montreal Builders' Exchange, on January 23rd. The following officers were elected by acclamation: President, Jas. Ballantyne; Vice-President, J. Brunet; Board of Directors, J. P. Anglin (General Contractors); Frank Pause (Carpenters); K. D. Church (Cement and Concrete); W. T. Castle (Painters); J. E. Walsh (Plumbers); E. W. Sayer (Electricians); Thomas Gilday (Roofers); Wm. Rutherword (Lumber); John Quinlan (Masonry and Cut Stone); Alex. Brenner (Builders' Supplies); T. A. Morrison (Brick and Quarry Supplies.

The President, Mr. Jos. N. Arcand, in reading the annual report, referred with feelings of pride to the commercial and industrial supremacy of Montreal and looked forward to the day when the entire island of Montreal would be a city of humming industry.

Referring to the Montreal building regulations, Mr. Arcand said:

"A French insurance expert, recently here, made the statement that Canadian fire losses were twenty times as great as in old France. As a matter of fact, the 'soot bill' in the United States and Canada for 1910 reached the trifling sum of over 234 millions, compared with 202 millions in 1909. In Canada alone the loss for 1910 was $23,750,000, against $15,250,000 in 1909. Putting it another way, the fire loss for the two countries equalled twice the whole year's new construction of either Montreal or Toronto. Or, on a cash basis, the loss per capita in the United States and Canada is $2.30 as against 33 cents per head in Europe. There are no other countries that present such a record. It is made also in face of the fact that on this continent the municipal fire protective services are maintained on a scale, with an efficiency and at a cost greater than elsewhere in the world. Some of the causes are evident on the surface, if any one will take a look at some of the buildings in process of erection in Montreal. That these buildings in design or execution comply with the law is inconceivable. Whether they do or not, their character is enough to explain why fire losses are twenty times greater here than in the old world. Every new fire trap tolerated in Montreal adds to the average fire loss, and therefore adds to the cost of insurance, besides being a grave menace to human life. The fire companies are not in the business for their health, for amusement, or for philanthropic purposes, and none of them are complaining about making too much money. It would require little less than a Niagara to put out a fire, with five minutes' start, in some buildings now going up in Montreal. Neither Fire Department nor Water Department can accomplish impossibilities. The Building Department has been notoriously undermanned, and any systematic inspection a physical impossibility. The time to see and appreciate the ingenuity of a fire trap is in the early stages of building, before the lath and plaster go on. Some of these structures are as surely predestined to the flames, as is an unelect Calvanist. Public sentiment, aroused to action by the disastrous fires in the "Herald" and Bishop St. buildings, demanded a prompt and thorough revision of the Building Code, a movement long advocated by your Executive Board, who heartily endorse the present efforts of the Board of Control to extend the zone of first-class buildings throughout the entire city area. The better the class of building, the better will be the calibre of the contractors. Furthermore, the staff of the Building Inspector's office has been absurdly inadequate; three, all told, when cities of equal size on this continent comprise a staff of 50. The revenue from building permits should be on a basis to make the department self-sustaining."

The meeting concluded with a vote of thanks to the officials who had acted during the past year.

Important Announcement Respecting Georgian Bay Canal

About 300 members of the Canadian Manufacturers' Association participated in the annual banquet of that institution held recently at Montreal. Excellent addresses were delivered by Hon. Rudolphe Lemieux, Hon. R. L. Borden, Sir Edmund Walker (president of the Canadian Bank of Commerce), and Mr. Chas. M. Hayes (president of the G. T. R.).

Hon. Rudolphe Lemieux made a notable statement in respect to the Georgian Bay Canal. The construction of this great work, he felt confident, would be commenced within the next few months.

The announcement of the Minister confirmed a rumor which had been around the city for some time that supplementary estimates were to be presented to the House for the purpose of dredging Riviere des Prairies and the French Rivr sections of the proposed canal.

Good Roads In Manitoba

The Manitoba Good Roads Association held an interesting session at the Winnipeg City Hall last week. Reeve Henderson, of Kildonan, president of the association, occupied the chair.

Letters regarding the use of split log drags for keeping roads in order, received from various points in the province, were read, and in every instance they spoke very highly of the good work that could be done by the use of a split log drag. In the case of the rural municipality of Springfield, the council thought so highly of its capability that they had purchased eight more for use during the present year.

Communications from the Pacific Highway Association were also presented, asking for the co-operation of the Manitoba Association in the furtherance of the national highway from Winnipeg to Vancouver.

Reeve Mager, of St. Vital, submitted a scheme for the consideration of the association, which was, in brief, as follows: "That the work of road building be left to the provincial government and its engineers, and that the government be asked to construct roads radiating for a distance of 100 miles from the cities of Winnipeg and St. Boniface, and that the cost of construction should be covered by the issue of long term bonds, payment of which should be guaranteed by charging it to different zones or districts, and the proportion being charged according to the distance from the centre of the good roads zone." This would leave Winnipeg and St. Boniface to take up about one-quarter of the bond issue jointly, the balance to be divided over the municipalities according to their distance from the centre. It was finally decided to present the by-law in its present condition to the legislature and see what the government was prepared to do with it.

The following committee was appointed to present the by-law: Reeve Henderson, Controller Waugh and Reeve Haddow, Rosser.

An interesting talk was also given by Highway Commissioner McGillivray, regarding his trip to the Indianapolis good roads convention last December. According to Mr. McGillivray, the good roads movement in the states was far in advance of that in Canada, their ideas being along the lines of a higher grade of construction. In one state 20,000 miles of earth roads were kept up solely by the use of the split log drags, and the Pennsylvania railroad had helped the movement by the free supply of split log drags at every one of its country stations, and also hauled gravel at a cost of 25 cents a yard, to help along the good roads movement.

Revelstoke Power Plant

The power plant nearing completion on the Illecillewaet River near Revelstoke, British Columbia, is an example of a municipally owned plant purchased from a private company, and now forming a valuable asset to a growing city. It also is interesting from a construction standpoint, illustrating the building of a large concrete dam in a narrow canyon, and from a designer's standpoint, on account of the means adopted to handle very severe frazil ice conditions.

The few remarks below on the city of Revelstoke will serve to indicate the reasons on which were based the original decision of the city to control its lighting system, and the later decision to remodel it in accordance with the plans which have lately been carried out at an expenditure of about $100,000.

The residents of the city have every confidence in its future, and the existence of cheap power, developed, should add very considerably to its prosperity. At the present rates for power and light without any increase of business the new plant will carry itself, including interest and sinking fund, and leave a small profit; so that all business above the present load, of about 400 h.p., will be largely profit.

Revelstoke is a city of about five thousand people, situated on the main line of the Canadian Pacific Railway at its junction with the Arrow Lakes and the Crow's Nest branch. At this point the Columbia River flows south from the Big Bend and Northern British Columbia districts, and is navigable for about two hundred miles south, including the Arrowhead Lakes, which are in reality a widening of the river, and north about forty miles at present. The city is therefore well situated from a railway standpoint.

Commercially it has been chiefly a railway and lumbering centre, and along these lines will continually increase; besides which a highly mineralized section north along the Columbia River and close to the south in the Lardeau districts may be expected to add to its industries and population.

Agriculturally, climatically, and from a scenic standpoint, the city has many advantages as yet but little recognized, and it is expected that they will add largely to its population in the near future. The winters are mild and equable, about the same as those of the northern Niagara Peninsula, while the summers are in every way ideal.

From a tourist's and hunter's standpoint the city, lying as it does between the Selkirks and the Gold range, in the centre of what is practically an uninhabited district, offers great advantages, which are now becoming better known.

It possesses the climate and fruit growing characteristics of the well known Kootenay country, but the extensive bench lands of the Columbia River adjoining it have not yet been denuded of their heavy growth of timber. As this is cut off, agriculture will play a large part in the future of the city. Additional railway transportation to the north is expected within the near future, and to this country the city will be a distributing centre.

The city owns its hydro-electric and waterworks systems, both of which are being remodelled and extended at present. The hydro-electric plant, which is fully described and illustrated in an article elsewhere in this issue, was designed and built by Messrs. Smith, Kerry & Chace, Engineers, through their Vancouver office, of which Mr. H. J. Haffuer is manager. The contract for the dam was let to William Newman & Co., of Winnipeg, and for the power house to E. G. Fromey, of Revelstoke.

The report of Building Inspector Fotheringham, just issued, showed that there were 671 permits of an estimated value of $3,020,651 taken out last year. This is a decrease from the year before, when there were 683 permits, estimated at $4,527,590. This, however, does not indicate any decrease in building in 1910, because a number of large permits were taken out in 1909 for which the construction was scarcely started in that year. The permits for 1910 indicate construction of solid brick or stone, $1,136,325; concrete, $370,650; brick veneer, $1,364,350; iron clad, $68,850; wood or frame, $82,475

The Universal Concrete Machinery Company, of Waterloo, Iowa, has recently been reorganized and incorporated for $25,000, taking over the business of the old company, which has been established and very successfully carried on for fifteen years by Mr. J. L. Shannon. Mr. Shannon is the president of the new company and his past record is a sufficient guarantee of the new concern. Mr. O. R. Taylor, the vice-president and treasurer, is very favorably known throughout the country and will give it added strength Mr. M. L. Cottrill, the secretary, has had extended experience. The company carries a full line of all kinds and is prepared to fill all orders with promptness and despatch

Ottawa Sure of Active Season

C. P. R. and Many Manufacturing Concerns have Important Plans—Tenders for Departmental Building

The prospects for building in Ottawa this season are very bright. The plans of the departmental building to be erected on Mackenzie avenue, which were revised, are almost completed. They will be very little different from the original plans for the interior, but a number of changes will be made with the elevations. It is expected that they will be made public and tenders called for very soon.

The Grand Trunk Railway will make extensive changes this year. The yards, round house and machine shops will be considerably enlarged. For some time the company has felt the need of more facilities here and had intended making extensions last year. However, it was not done, partially on account of the strike. This summer the extensions will be made and they will be sufficient to accommodate a great deal of expansion. The company will also erect a new swing bridge across the Rideau canal at the foot of Elgin street. This work will be begun at once.

The Central Canada Exhibition Association has decided to postpone the building of the new machinery hall at Lansdowne Park until next year, and it is proposed that then a new agricultural hall be also built. The estimated cost of the machinery hall is $75,000. However, there will be a great deal of work done at this park. The lake, which takes up a valuable lot of space, will be filled in. The electric light wires will be placed under ground and the lighting of the grounds will be done in a much more extensive manner. A new roof will be placed on Howick Hall.

The Public School Board will probably build a large brick annex to Mutchmore street school, and the work will be begun early in the spring. There are no new schools anticipated. The Separate School Board has not yet decided whether or not it will build another school this year. During 1910 $70,624.68 was spent in erecting new schools, and $8,929.38 in repairs, by the Public School Boards.

During the past year twelve new industries came to Ottawa. These include the Continental Bag and Paper Company, Stronglite Box Company, Dustbane Manufacturing Company, Davidson & Crooks, McLaughlin Paint Works, Wilson's sash door finishings, Kerr's Ornamental Glass Works, Ottawa Specialty Company, Beaver Board Company, Henderson Bros. (hair cloth, etc.), Ottawa Vacuum Cleaner Company, and the Diamond-Arrow Motor Car Company. Of these the Beaver Board Company have purchased a site and expect to build a plant in the spring. The same is the case with Henderson Brothers. The Ottawa Vacuum Cleaner Company is now trying to locate a suitable factory.

The Ottawa Electric Light Company will make extensive changes this summer. It has just completed its large fireproof building on Slater street, which gives great facility for future growth. The construction, line, meter and testing departments, draughting rooms and inspectors' headquarters will be in this building, and on the top floor will be installed a switchboard. Next year this will be a sub-station from which all the electricity for light and power for the central and eastern parts of the city will be distributed. The power will be brought in bulk from the three power houses of the company, underground to this sub-station. Nine vitrified clay ducts will be installed from the power houses to the Slater street station, a distance of about 9,000 feet. For the present, six cables will be run through them which will deliver about 5,000 horse-power to the sub-station. On leaving the station again the wires will travel a distance under ground, coming up along side of poles, one by one, to form aerial lines. This will avoid bunching the wires at any one point on the poles. The station on Amelia Island will be made the central or main generating station. It has been completely overhauled and most modern machinery installed. The present main station on Head street will be known as the auxiliary hydraulic generating station. street. By means of ducts all these stations will be tied together underground (they are now overhead), and likewise by ducts to three generating plants of other concerns so that in case of trouble there will be many sources of assistance to rely on, making it almost impossible for the service to be seriously interrupted.

Montreal Builders' Annual Banquet

The annual banquet of the Montreal Builders' Exchange was held on January 18th. Some two hundred guests sat down in the Green room of the Windsor Hotel under the presidency of Mr. Joseph Arcand. Among the guests of honor were Hon. L. P. Brodeur, Minister of Marine; Mr. J. L. Perron, K.C., M.L.A.; Mayor Guerin, Mayor Rutherford, of Westmount; Ald. J. H. Sherrard, Mr. F. Bourbonniere, K.C. (representing Mr. O. S. Perrault, president of the Chambre de Commerce), Mr. Geo. R. Smith, M.L.A.; Mr. J. R. Gardiner (president Architects' Association), Mr. Jas. Bennett (chief inspector, Underwriters' Association), Mr. Cecil Doutre (Manufacturers' Association).

The toast of "Our Country" was proposed by Mr. James Ballantyne, who said that the builders had their share in the upbuilding of the country by erecting buildings which were architecurally pleasing and substantial enough to stand for many years to come. It seemed to him that the country was advancing so rapidly that it would be difficult for the builders to catch up, especially in the west. He was pleased to know that the group of buildings in course of erection for educational purposes in Saskatchewan was being built entirely by Canadian contractors and architects.

Hon. L. P. Brodeur delivered an interesting address in reply to the toast. He predicted greater activity in the building industry with the construction of the Canadian navy, the policy of the Government being that the ships should be built in Canada. The ships and shipyards would also benefie a number of allied industries.

Mr. Gardiner, president of the Province of Quebec Architects' Association, referring to the subject of technical education, suggested that workmen should be graded according to ability and paid according to their certificates. Such a system, he thought, would encourage them to seek proper technical training.

Other speakers were Mayor Rutherford, of Westmount, Mayor Guerin, of Montreal, Ald. Sherrard (vice-president of the Manufacturers' Association), and Mr. W. T. Castle.

C. P. R. Western Programme

Mr. Wm. Whyte, vice-president of the C. P. R., states that his company will build nearly 500 miles of track west of the Great Lakes this season. The double track from Winnipeg to Brandon will be completed and there will also be constructed seven miles of double track east of Moose Jaw and sixteen and a half miles west of that city. Three new steel bridges will be built over the Bow river east and west of Calgary.

As for the new work to be carried on by the C. P. R. west of Lake Superior this year, the vice-president said that two lines of 25 miles each will be built south from the main line skirting both the east and west side of Tramping Lake, where a good many new settlers have found farms and a very flourishing part of the country exists. A line will likewise be built 35 miles northwest of Swift Current, and a second 45 miles in extent southeasterly. The track from Moose Jaw southwest will also be extended 35 miles, while 20 miles

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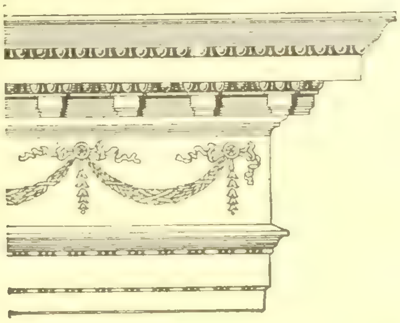

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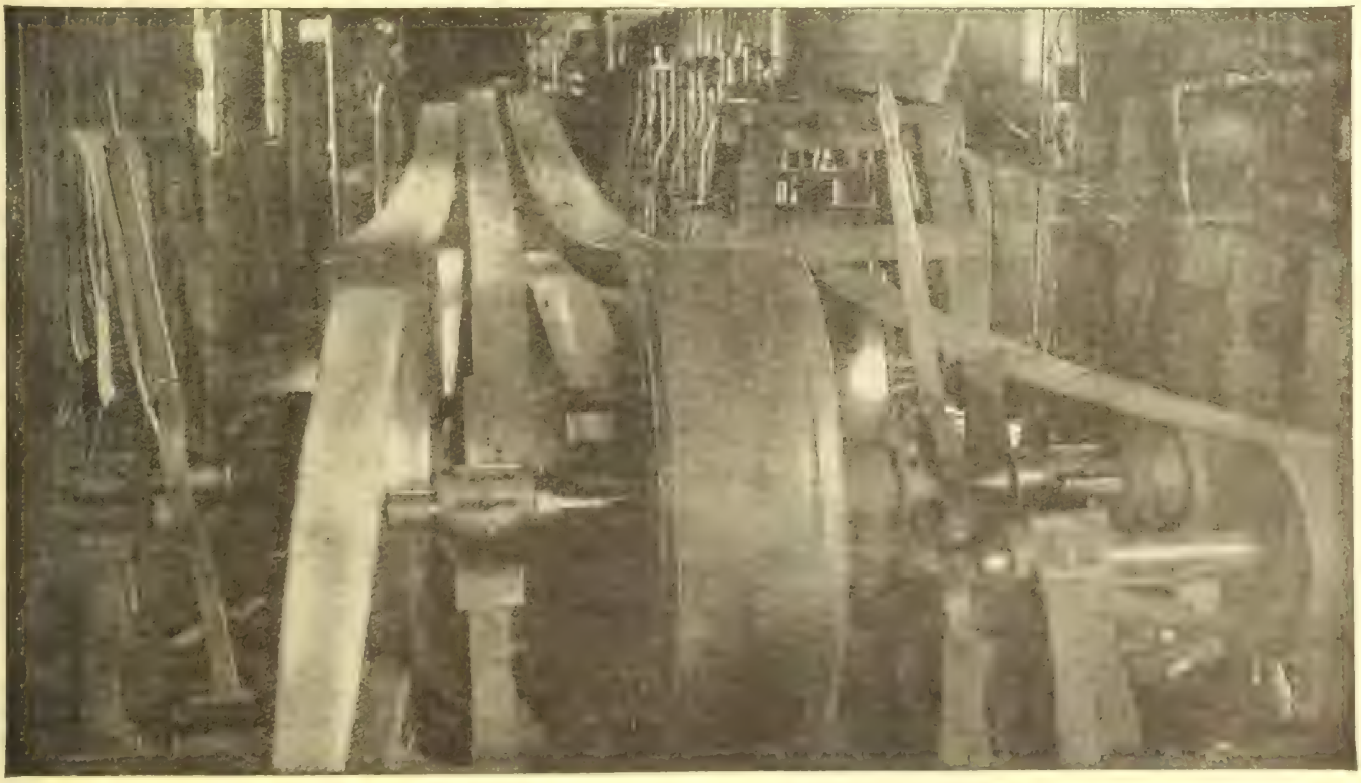

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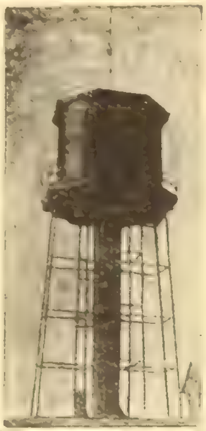

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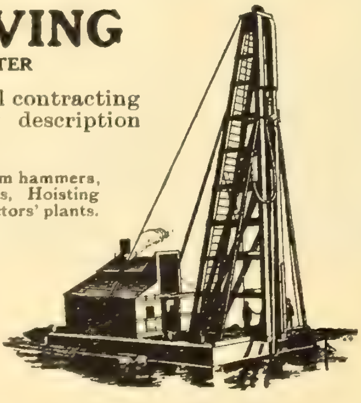

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will be added to the line east of Weyburn. Thirty-five miles will be built northwest of Estevan, while 32 more miles will be built through the Cut Knife district. Twenty miles will be built from Golden to Spilamachine Landing, and later on this will be the chief route uniting the main line of the C. P. R. and the Crow's Nest.

Personal News and Notes

The annual statement of the Canada Cement Company, issued last week, shows cash in hand, $916,169, and a surplus of over $2,000,000.

Mr. H. J. Glaubitz, consulting engineer, Toronto, has been appointed head engineer of the Waterworks Department at London, Ont., at a salary of $3,600 a year.

The annual convention of the Alberta Association of Architects was held at Calgary, January 30 and 31. The members were entertained to a banquet at the Grosvenor Hotel by the local chapter on the evening of January 30.

The City Architect of Toronto has issued a detailed statement of the city's building for 1910, which represented a total value of $21,127,783. The more important items in order of size are the following:- brick dwellings, $9,907,377; stores and offices, $1,879,415; hospitals, $1,186,000; factories, $1,171,450; rough cast dwellings (brick fronts) $866,950; warehouses, $689,595; schools, $644,590; churches, $551,300.

A special committee of the York County Council is discussing the question of appointing commissioners to cooperate with the city in the inauguration of the good roads project. It is expected that at least one road building inspector will have a place on the commission.

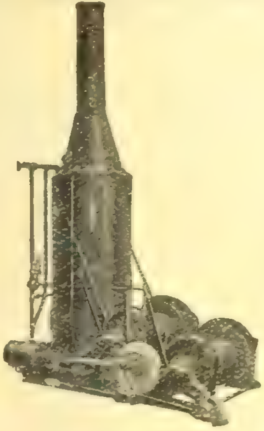
A by-law looking to the purchase of a $25,000 paving plant will be submitted to the citizens of Calgary at an early date. City Engineer Child made a report in this connection and estimated the capacity of such a plant at from 800 to 1,000 yards a day. He expects to effect a considerable saving by its use.

The Ottawa Branch of the Canadian Society of Civil Engineers held a banquet on Wednesday, February 1st. Mr. A. A. Dion presided and there were about fifty members present. An informal discussion was held following reports of the members who had attended the recent meeting of the parent society in Winnipeg.

Mr. D. Chene, City Engineer of Hull, Que., returned recently from Paris, France, where he has spent the last four months in a study of bacteriology at the Pasteur Institute. Mr. Chene made a special study of the methods adopted in the European city, where a perfect analysis can be made within 24 hours. During his stay in Paris he was awarded a certificate as a qualified analyst.

The building permits issued by the city of North Vancouver during 1910 represented a total value of $395,440. In regard to building conditions and prospects, Mr. Thomas Shepherd, City Clerk, writes: "We have entered upon what will assuredly be a year of great progress in the erection of permanent buildings and the carrying out of permanent improvements. The new building by-law came into operation on January 1st. Extensive sewerage work was started on January 16th."

The annual convention of the Alberta Association of Architects was held last week in Calgary under the presidency of Mr. Henderson, of Edmonton. The officers for 1911 are, hon. president, E. C. Hopkins, Edmonton; president, S. M. Lang, Calgary; secretary, L. M. Gotch, Calgary; hon. secretary, R. W. Lines, Edmonton; treasurer, D. S. McElroy, Calgary; examiners, G. M. Lang, W. S. Bates, James Henderson, L. M. Gotch, and R. W. Lines; auditors, A. Pierie and J. J. O'Gara; librarian, R. W. Lines.



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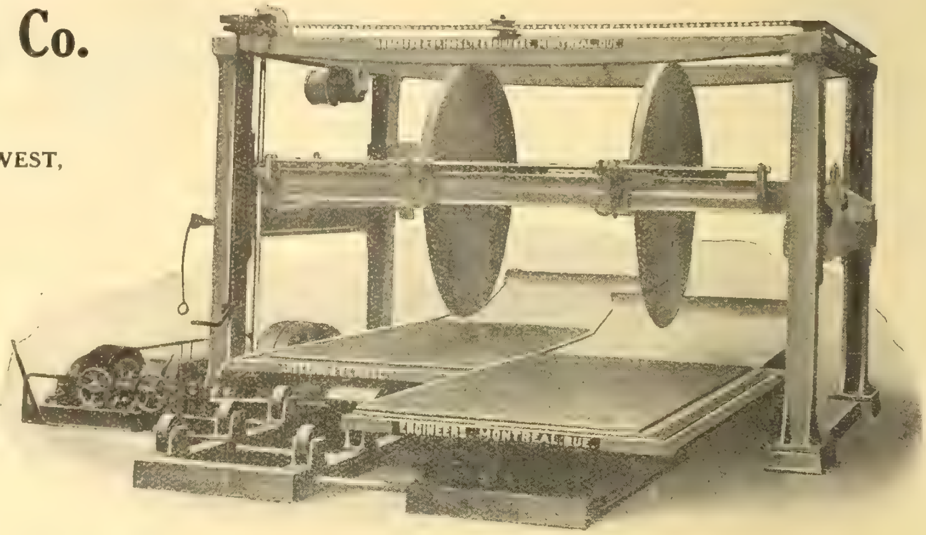

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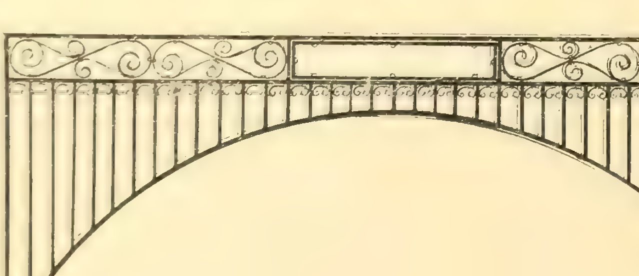

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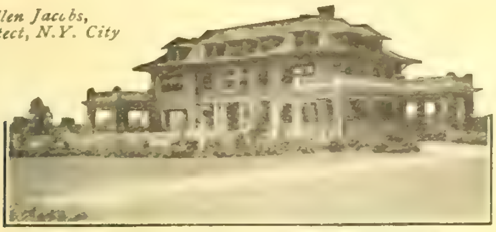

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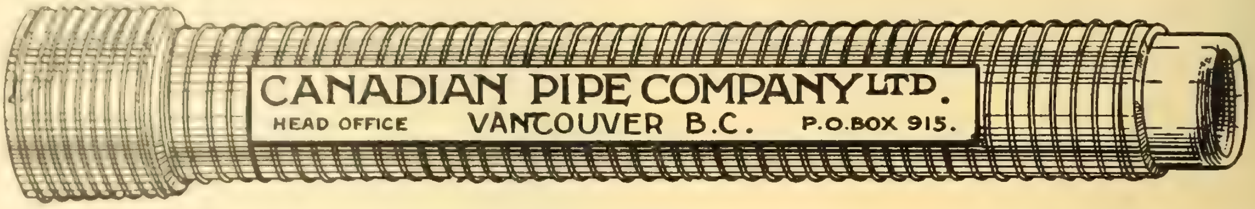
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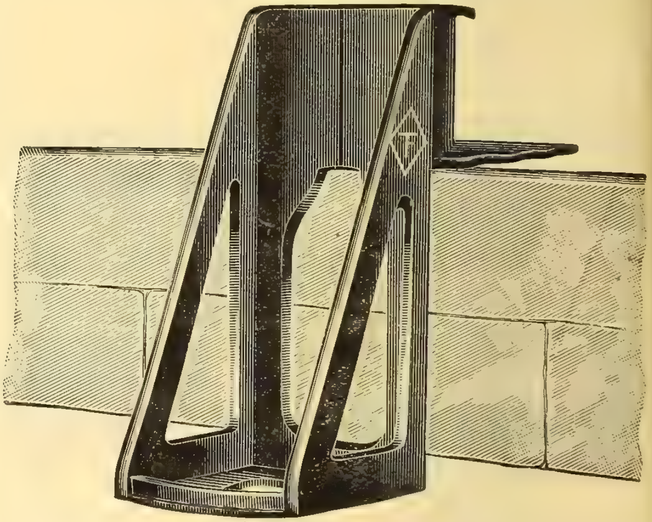

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The following are wholesale prices delivered at Toronto:—

	Per B.
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.
Floor Tile—½-inch square, 65 cents.
Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.
Vitreous Tile—All sizes, according to color, 55 to 65 cents.
Glazed—White, 6 x 3 inches, 55 cents per square foot.
Matt—Dull finish colors, first, 70 cents.
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Lead Pipe.

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

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(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.
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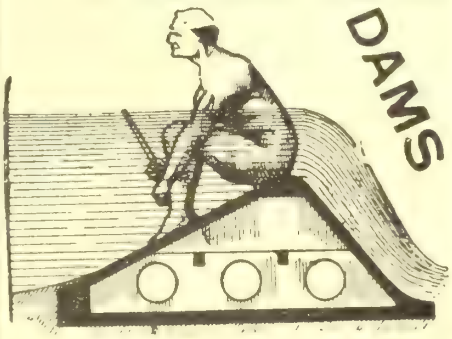

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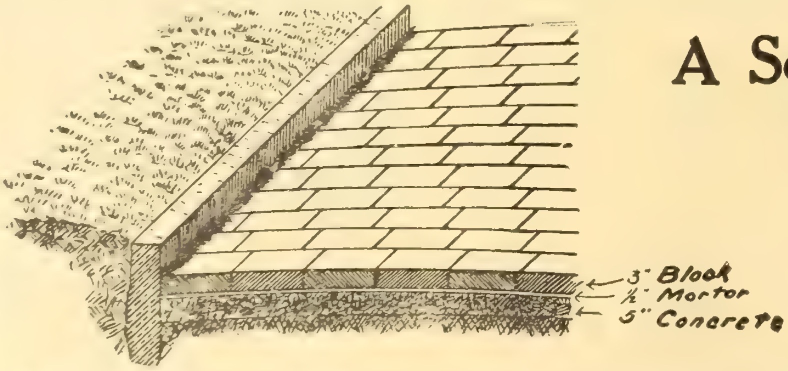

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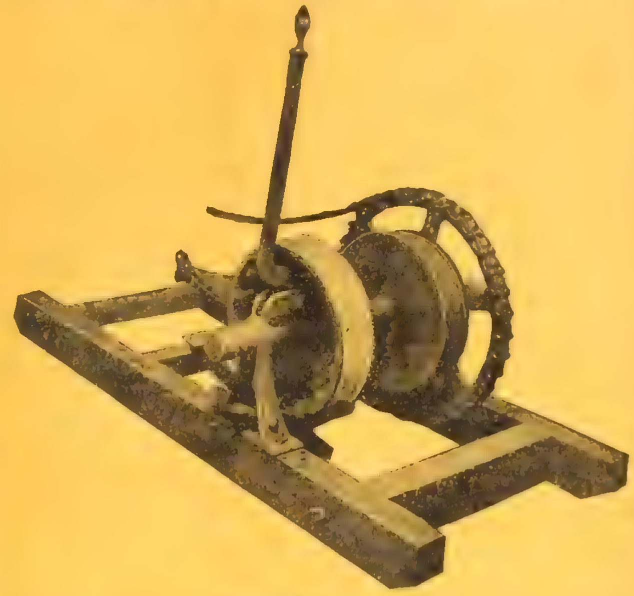

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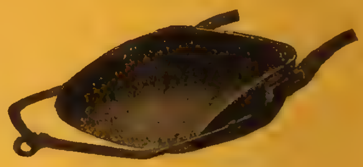

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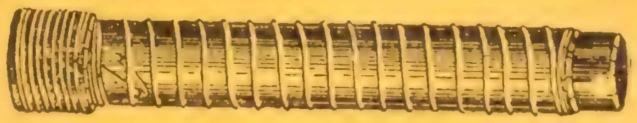

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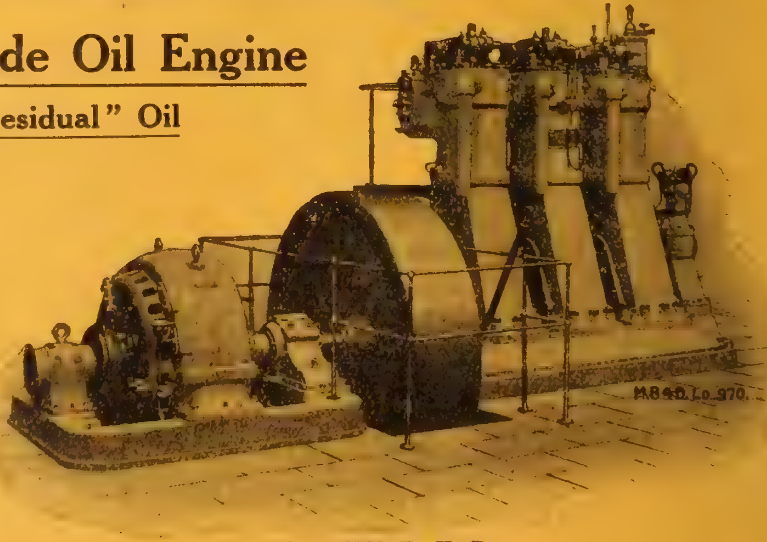

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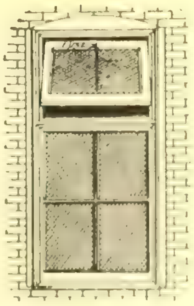

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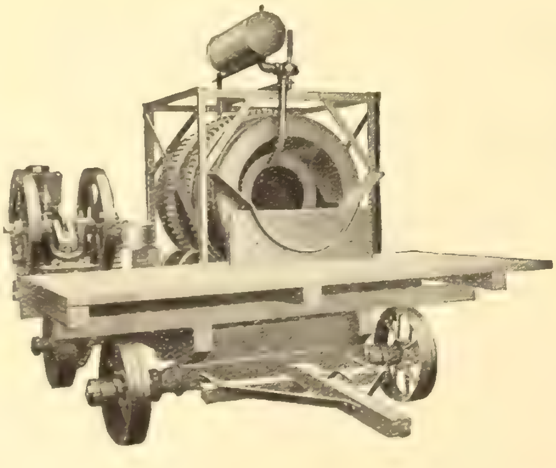

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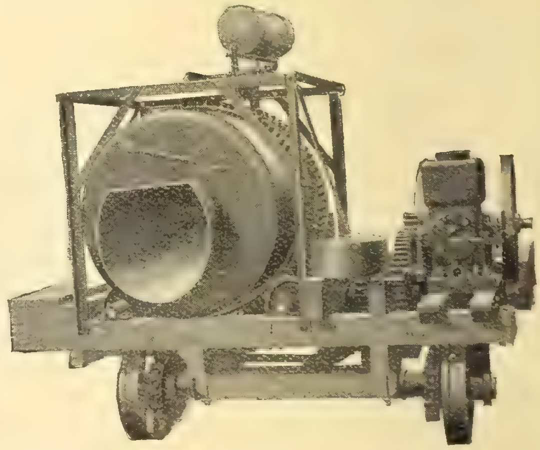

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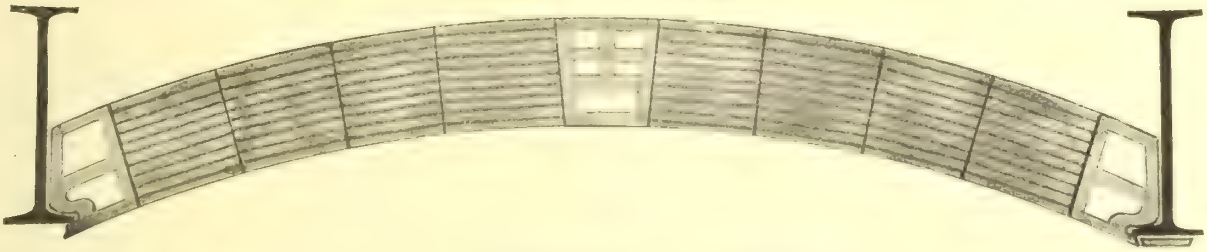

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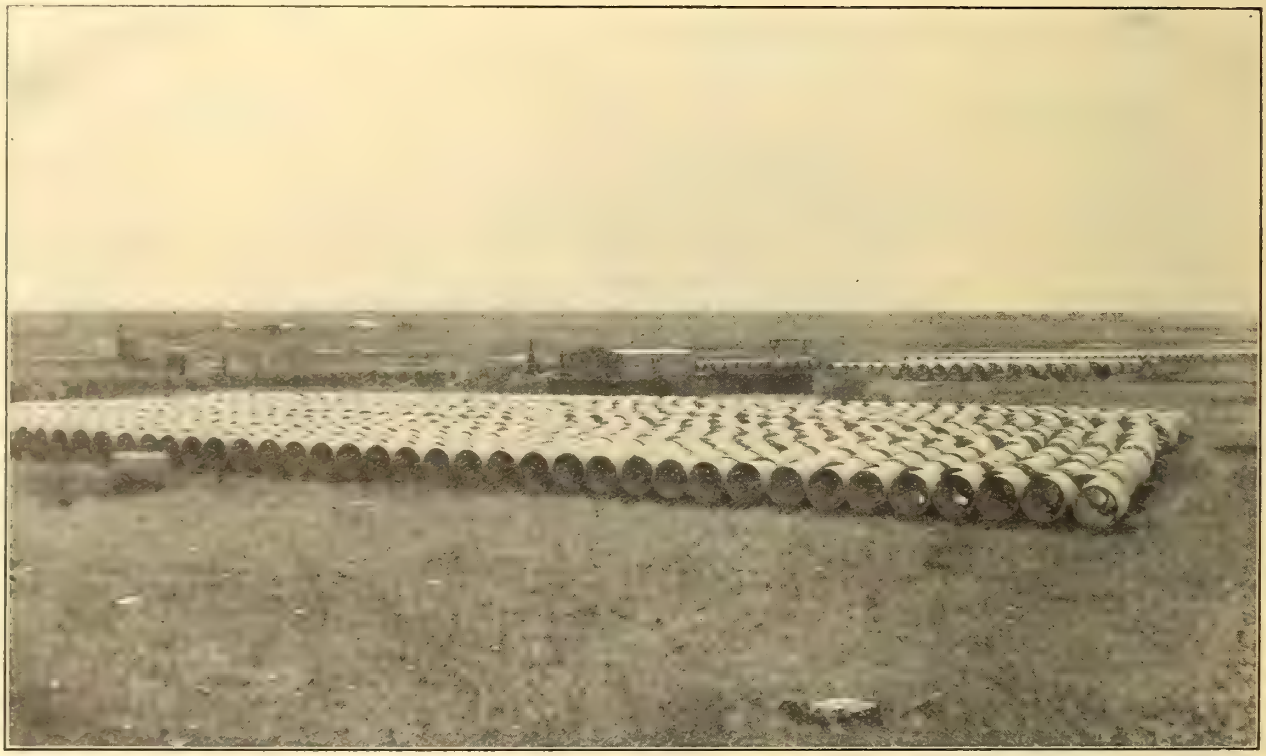

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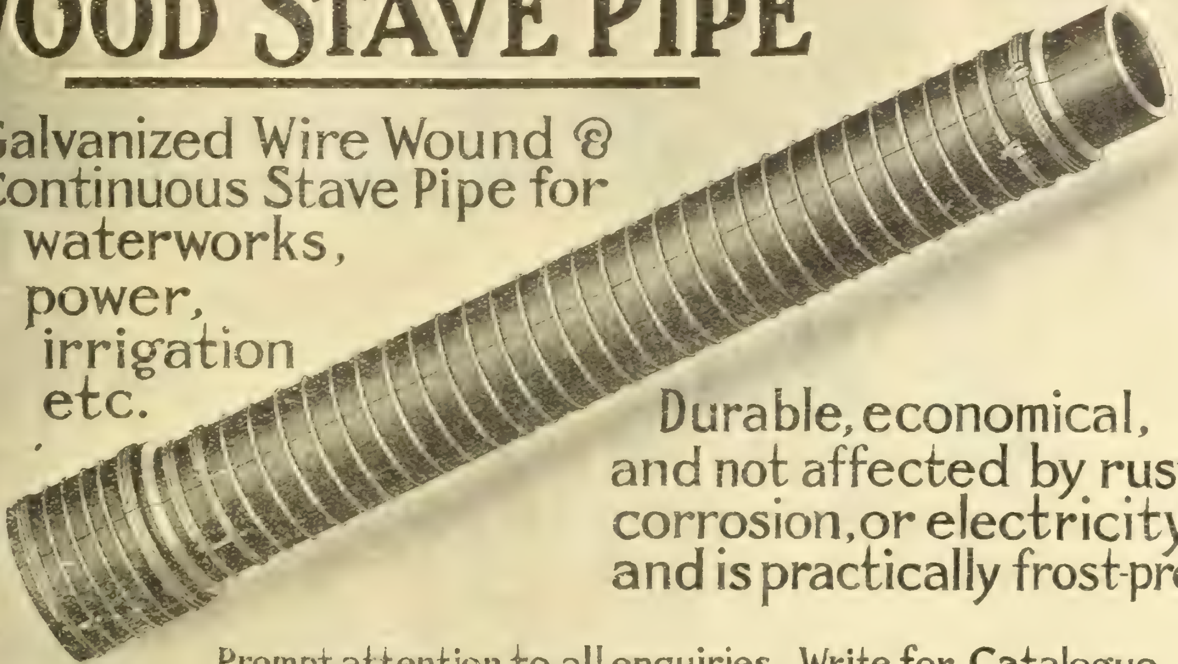

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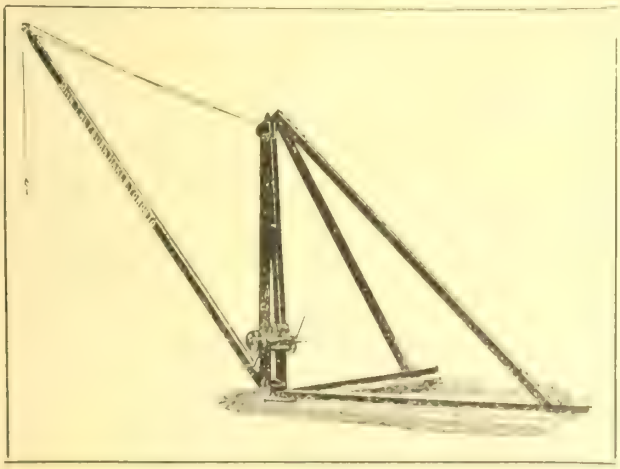

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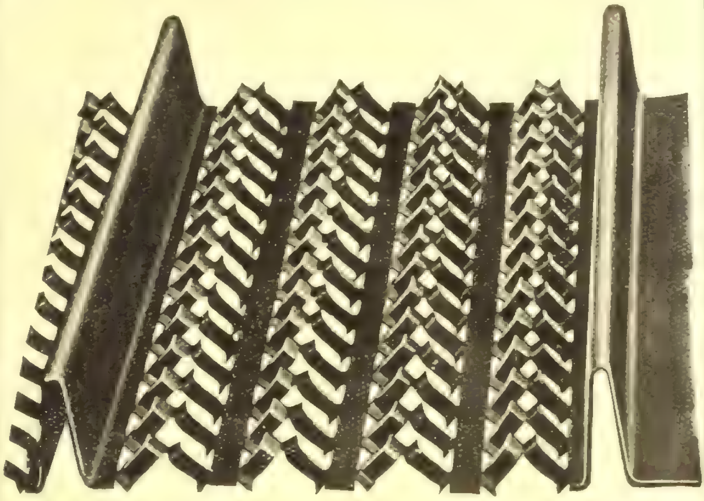

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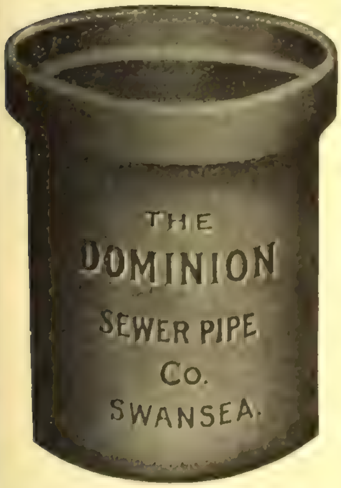

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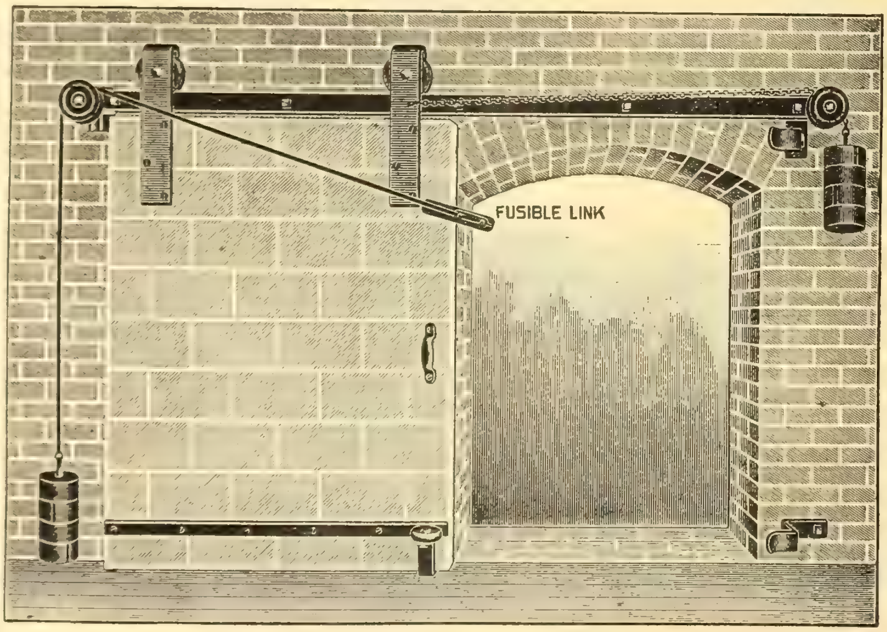

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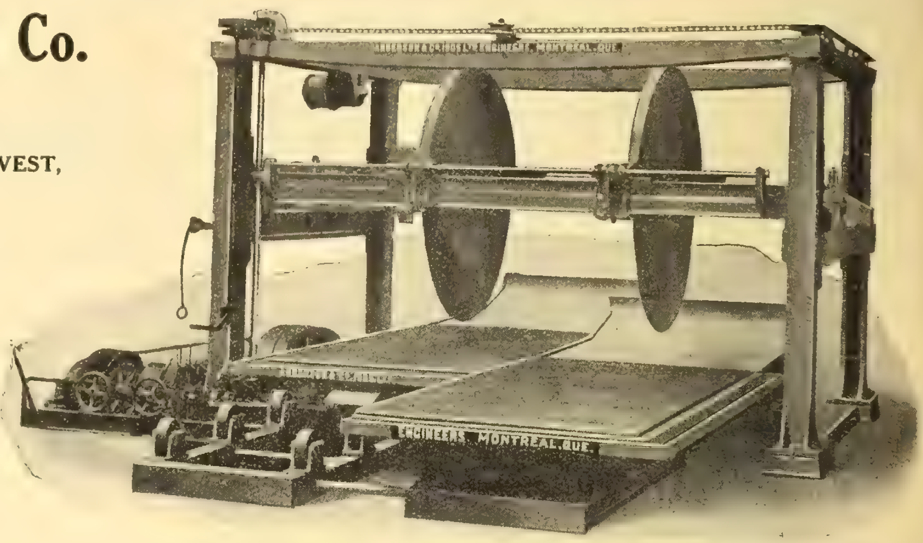
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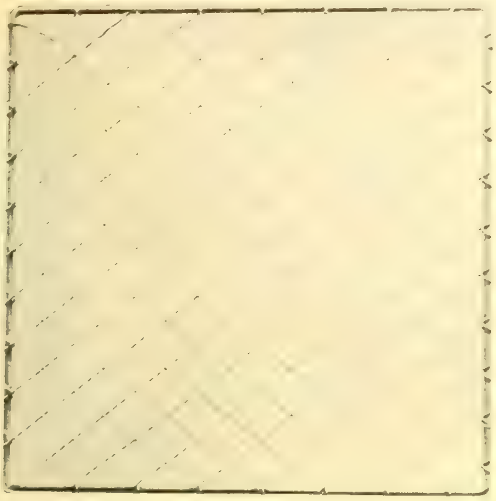

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Portland Cement, Lafarge Cement, Gravel, Sand, Rubble, Imported and Canadian Pressed Brick for front work and fireplaces.

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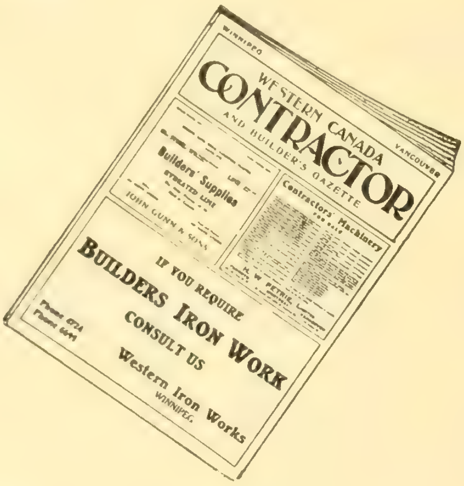
Western Canada Provides a Rich Market

for building, construction and engineering supplies of all kinds. The WESTERN CANADA CONTRACTOR is the only publication west of the Great Lakes devoted to the interests of architects, engineers, contractors builders, etc.



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The nature and quantity of reagent necessary to remove injurious and energy wasting properties from feed water may be successfully determined by a competent chemist with a well equipped laboratory. But—the real problem lies in accurately supplying and adding the chemicals so as to have a continuous and uniform supply of soft water under all conditions—at a *definite* and *reasonable* cost.

The American meets these conditions completely!

If you are not entirely familiar with the disadvantages of Hard Water, and are desirious of knowing about the advantages of Soft Water, a word to us will bring full information.

We design and build Water Filters of any capacity for every purpose

American Water Softener Co.
Chestnut St. - Philadelphia, P. A.
"A Laborer can operate the American"

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Do not overlook the protection of your windows and security insured by installing our
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Insist on having HARD STEEL WIRE
WE SOLICIT YOUR ENQUIRIES

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The
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Good contractors know that it always pays to get the best appliances.
The Willson Portable Flare Light, which is specially adapted for use in all kinds of construction work, cannot be beaten in efficiency or cost. Think of it, this light gives a candle power of 8,000 at a cost of less than six cents an hour.

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Limited
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Guaranteed for Five Years

Our Air Valve Catalog describes this Valve and others of our manufacture — also Pressure and Steam Gauges.

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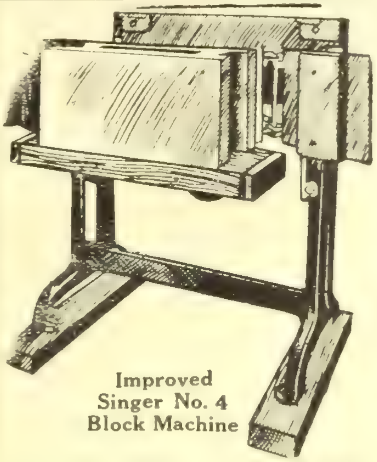
Jas. P. Marsh & Co., 224 Washington St. CHICAGO, ILL.
Established 1865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Face Down Blocks

Blocks 4″, 6″, 8″, 10″, 12″, 16″ and 20″ long.
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All Blocks on One-size Pallet.

Sold in combination to suit purchaser at reasonable prices

Guaranteed against defective material or poor workmanship.

Our catalogue R. with full information and prices on request.

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Niagara Falls, Ont.

Business Insurance

How is business built up and reputation acquired?
Every Architect and Contractor must answer that question in the most practical way.

The degree of **his** success **depends** altogether on **the service rendered** and the **goods specified** or **recommended.**

There's no escaping **that** conclusion.

Naturally, we believe **International Varnish Products** are the best of their class you **can** specify or recommend.

Prejudiced we may be, but we have logical reasons for the faith that is in us.

You see we have been manufacturing varnishes, enamels, stains and finshes for over forty years.

We have worked hard and spent money like water to perfect our products.

And **many** prominent Architects and Contractors **declare** that **we have succeeded splendidly.**

We do not ask you to take our word.

Send us your name and address and we'll mail you a nickle steel bound book that actually shows things.

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International Products are always sold in Full Imperial Measure Cans.

International Varnish Co., Limited
TORONTO WINNIPEG

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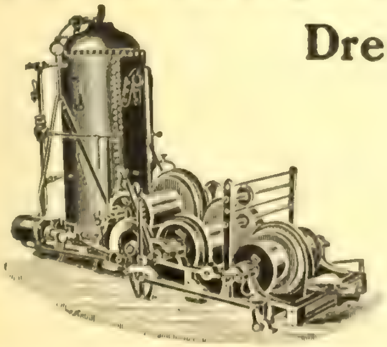
M. Beatty & Sons, Limited Welland, Ontario, Canada



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"Galt" Art Metal Ceilings are sold strictly on their merits, their **mechanical superiority** and faithfulness to art in styles they typify.

Machine-cut beads (patented process) make them easy to apply. Plates snap into place and seams fit snugly together. Why waste your time puttying and peening the joints on old-fashioned stuff when the new is here and costs less?

Write us about your Metal Ceiling work

THE GALT ART METAL CO.,
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Another reason for the remarkable Herringbone demand.

Herringbone Lath has the Best Key

Something of a stunt for wet mortar.

The Herringbone Ribs, seen from the back of the lath are shelves. The clinch rests securely here. Instead of dropping, it tightly seals in the filaments.

Perfect Key means Never Cracking Plaster

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Guelph Hydrated

Lime

You will save dollars if you use this brand in place of ordinary lime.

- IT'S LESS TROUBLE
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and a hundred other reasons that you can discover by using it.

Specify **Guelph Hydrated Lime** when ordering from your dealer.

Standard White Lime Co.
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CRANES

Built for Every Service
up to 75 tons capacity

Electric Traveling Cranes, Standard
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High and Low Lift

These pumps have attained a world wide reputation for their excellence of design, high efficiency and ability to operate continuously for long periods, and under the severest conditions.

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Manufactured for use throughout the Dominion of Canada by

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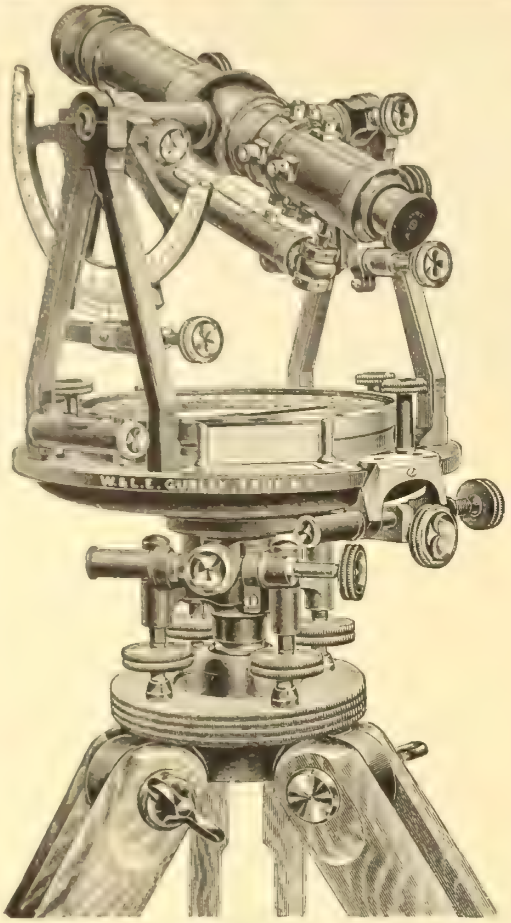

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Largest Manufacturers in America of

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Physical and Scientific Laboratory Apparatus
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Branch Factory: Manufacturers Exchange Building Seattle, Wash.

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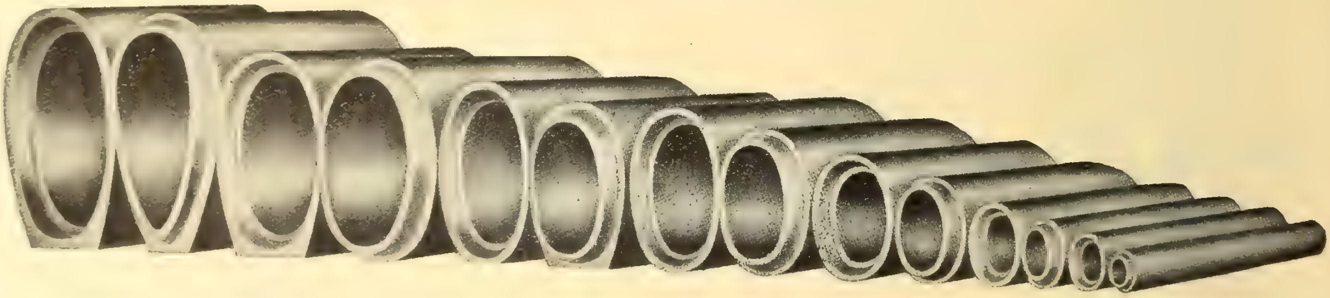

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Reinforced Concrete Pipe

for Culverts and Sewers

"Long Service at Low Cost"

Our **Pipe** is **frost-proof, indestructible** and **everlasting.** It is easily handled, easily placed, and easily procured. It has been approved by **most particular, most renowned, most experienced,** and **most skilled engineers.**

Stock sizes 6 inch to 48 inch. Other sizes to order. **Write for catalogue and prices**

Dominion Concrete Company, Limited

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CORINTHIAN STONE

was used in this building as well as for two others for the same proprietor. Why!

Because it was the Best

The same reason applies to others.

Any Size

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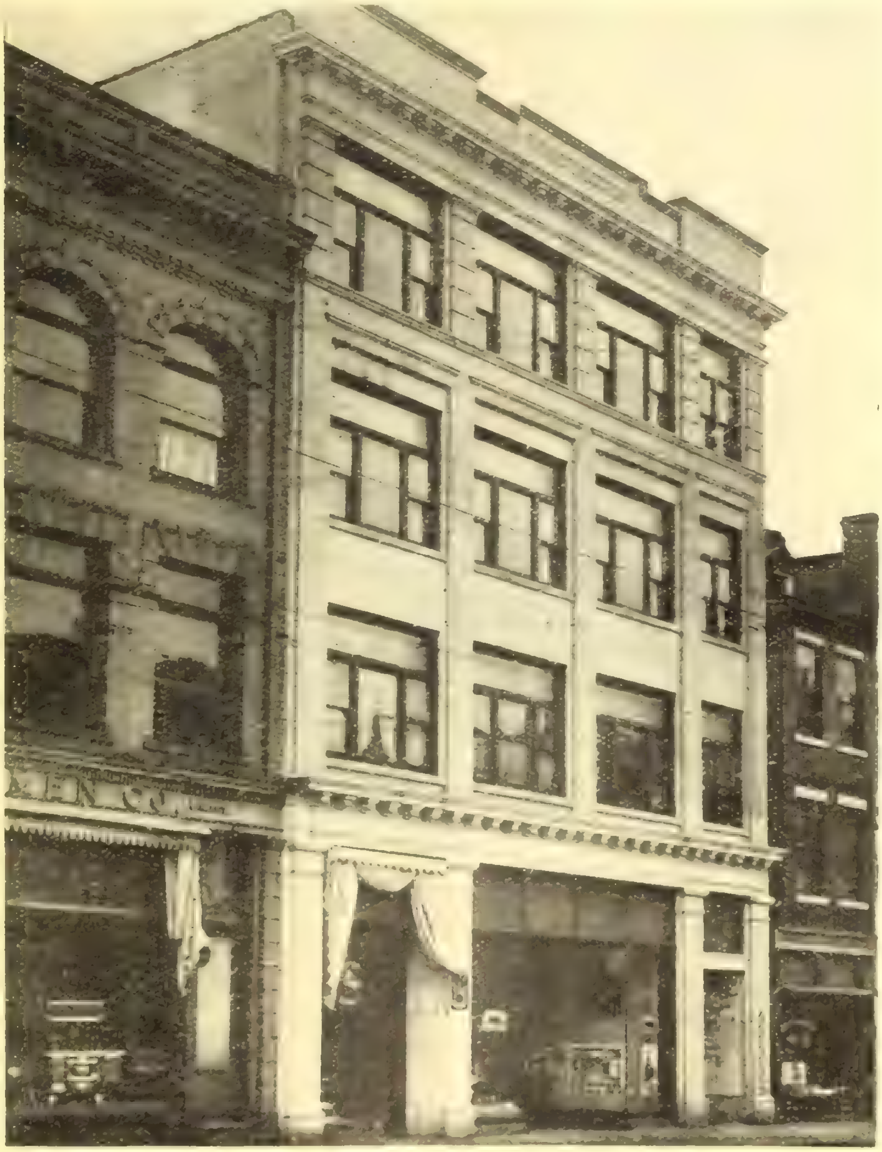

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Weber Chambers, King Street, Berlin Architect, Chas. E. Cowan, Esq., Berlin

Erected 1910 by the I. S. K. WEBER CO., LIMITED, BERLIN

All the Stone for above building supplied by

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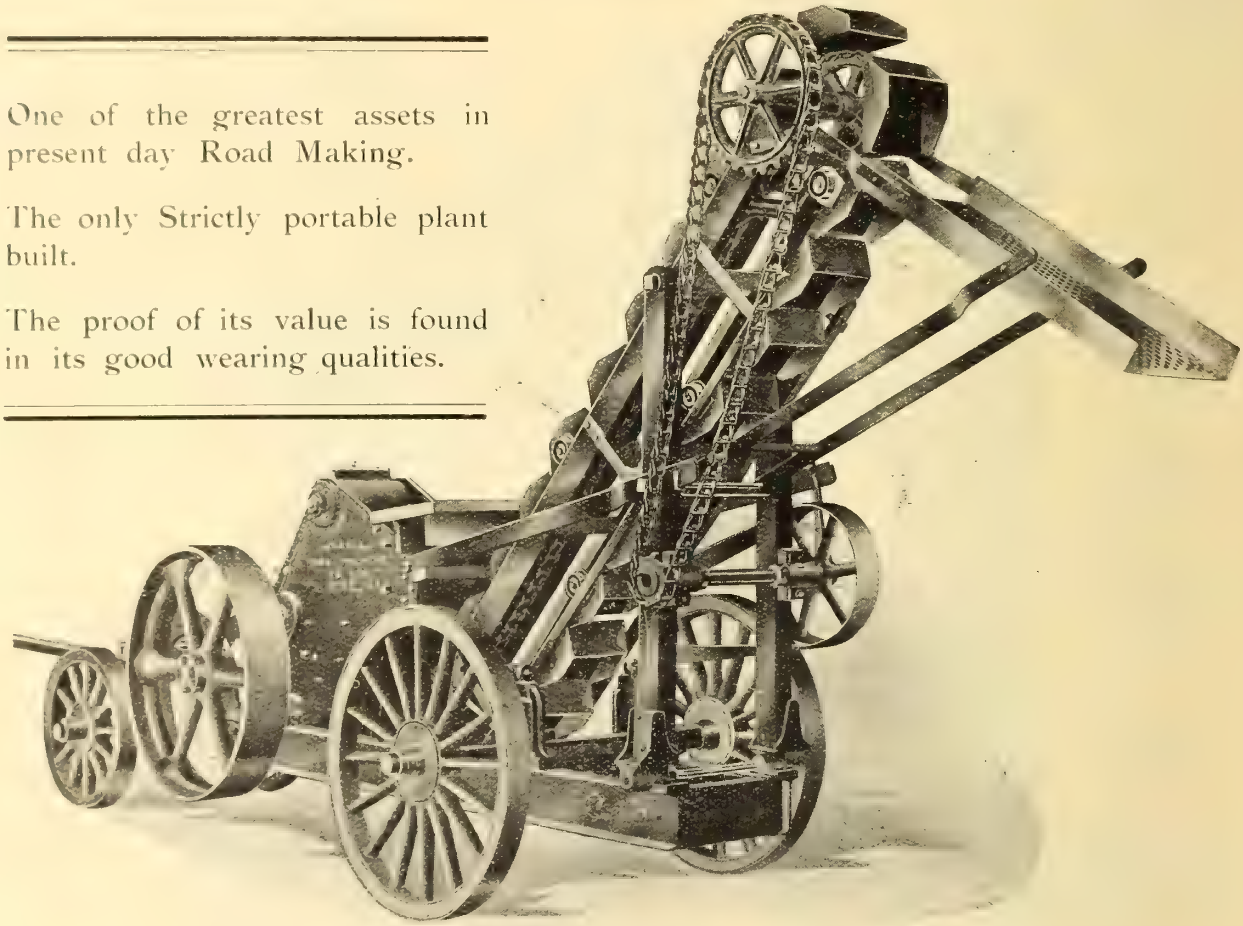
Mounted Crusher

One of the greatest assets in present day Road Making.

The only Strictly portable plant built.

The proof of its value is found in its good wearing qualities.



"Champion Crushers" are the Cheapest Machines to use because they last longer and cost less for repairs than any others. Need only to be driven half as fast as other crushers to produce the same results.

Send for descriptive Catalogue of **"Champion"**
Crushing and Road Building Machinery.

The Hamilton Machinery Company, Ltd.

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THE WATEROUS ROLLER

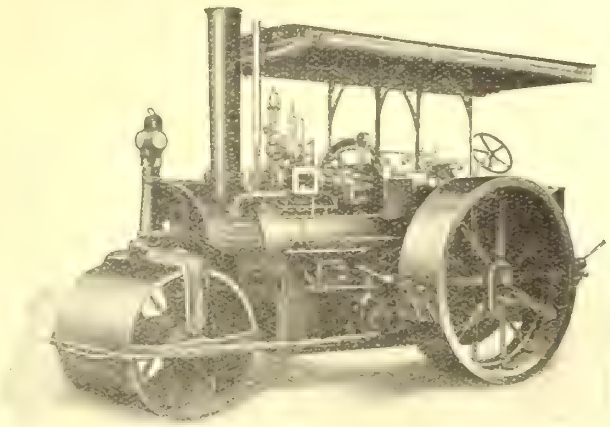
for Every Operation in Road Building

The special features which distinguish the Waterous Road Roller—the double cylinder, double crank engine, two speed gearing, high pressure boiler, etc.—make it adaptable for all road building operations.

It can be used to haul road metal, to plough or pick up old roads; the double speed makes it suitable for slow or fast rolling, and the band wheel attachment and perfect governor control allows its use in driving rock crusher.

It is built in 10, 12 and 15 ton sizes. With over 75 machines in use in Canada to-day, this Roller is proving its ability to make good on all kinds of road work.

Send for twenty page Bulletin No. 301



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THE WATEROUS ENGINE WORKS CO. Limited BRANTFORD, CANADA

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Inter-phones

No. 2016 Type-Metal Inter-phone for desk use

Inter-phones will connect all your departments—bring all the strings of your business to your own office chair—and make it possible for you to get in touch with any of your employees—or for them to get in touch with each other—at a second's notice and without loss of time.

No. 1324 Non-Flush Type Metal Inter-phone for wall mounting

Inter-phones cost little to install and operate at a low maintenance charge. The minutes they save will pay over and over again the cost of their installation and operation.

On request we will be glad to send you **free** Bulletin No. 1042 with full particulars.

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Manufacturers and suppliers of all apparatus and equipment used in the construction, operation and maintenance of Telephone, Fire Alarm, and Electric Railway Plants. Address our nearest house

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Start Right

by specifying Hamilton Pressed Brick for every job where a clean, smooth and distinctive effect is desired.

Hamilton Pressed Brick is made from shale, not clay, rich in Iron Oxide free from so called Soda. Besides furnishing this high class product we can fill your orders promptly. Connections with T. H. B., C. P. R., G. T. R., M. C. R.

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Office 2931
Residence 345

Spectator Building, Hamilton, Ont.

Do You Think

that you can Afford

to pass us by before getting our prices on your requirements or before putting in your tenders on

Plate Sheet Fancy

or any kind of

Glazing Glass

The

Consolidated Plate Glass Co.

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The Consolidated Stone Company

Quarries and Mills at Bedford, Indiana, and Bloomington, Indiana

Producers of Dark Hollow Buff and Blue
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The Celebrated

Bedford Stone

from our quarries has been used in many of the largest public buildings, churches, etc., in the United States and Canada.

Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

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MAKE A "STRIKE"

by having an exhibit at the Third Annual

CEMENT SHOW

St. Lawrence Arena Toronto

MARCH 6th, to 11th.

For information and space address

Wm. Snaith, Secretary & Manager - **57 Adelaide St. E.**

Steel and Wood TANKS

Suitable for Sprinkler Systems
Fire Protection, Water Supply
Plants, etc.

Steel Substructures of all kinds
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PILE DRIVING
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Pile Driving and general contracting
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Construction Co.**

Office: 64 Niagara St.
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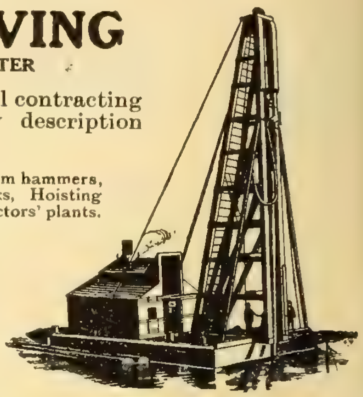
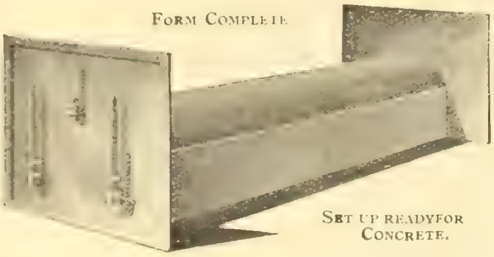


**COLLAPSIBLE
STEEL FORMS**

For the Building of
**Culverts, Conduits, Small
Bridges, Sewers, Etc.**

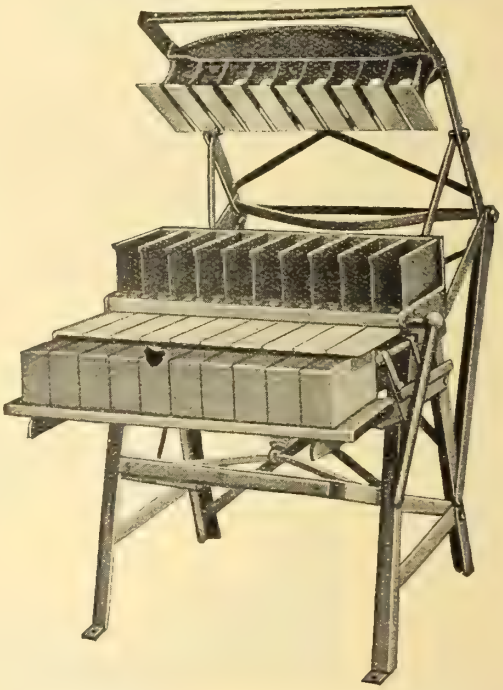


Our Collapsible Steel Forms are the lightest, strongest and most durable made. They combine in the simplest way every requirement for rapid and practical work, and are attracting wide attention. They are highly endorsed by road and street officials, contractors and engineers everywhere.

Write for Form Catalogue
Engine Catalogue for the asking
Commissioner's Time Book Free

Concrete Form & Engine Co.
Successor to Collapsible Steel Form Co.
Detroit - Mich.

The Perfect Brick Machine
Patented in Canada
is what its name implies "Perfect"



This machine will be in operation daily during the Toronto Cement Show in March.

C. S. WERT
Inventor and Manufacturer of the Perfect Brick Machine
KENDALLVILLE - INDIANA

THE H. & E. PATENT BALL-BEARING LIFTING JACKS

For Railway and Bridge Work, Contractors' and Builders' Use

Made by practical Jack Builders. Material: best grades of malleable iron and stee
Fully guaranteed as to durability and efficiency. The long even stroke of the lever, together with the design and careful construction of the jack, makes it the quickest and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

To any responsible Firm or Railway in Canada any of these jacks will be sent on 30 days trial.

Manufactured by
H. & E. Lifting Jack Company
Waterville, Que.

Stock carried by F. H. Hopkins & Company, Montreal

Canada's Largest Reinforced Concrete Building

constructed throughout in the

KAHN SYSTEM

The new Jacobs Building, the largest reinforced concrete building in Canada, which is now nearing completion at the corner of St. Catherine and St. Alexander Streets, Montreal.
Mitchell and Creighton, Architects

Rapidity of erection was a feature.

ARCHITECTS If you wish the best material on the market, and adequacy of design, freedom from worry, the services of our splendid organization and engineering department coupled with economical construction

Specify Kahn System

We will cheerfully assist you in any way.

CONTRACTORS if you desire prompt delivery, materials easy and economical to handle, a great elimination of field labor, materials cut to exact lengths order Kahn System materials:

Kahn Trussed Bars for beams and girders, Cup Bars for floors and columns, Rib Metal for floors and roofs, Hy-Rib for roofs, walls and partitions, rib Lath for plaster work, Column Hooping, Trussed Chemical Products including waterproofers and finishers

Trussed Concrete Steel Co., Limited

Head Office and Works: WALKERVILLE, ONT.

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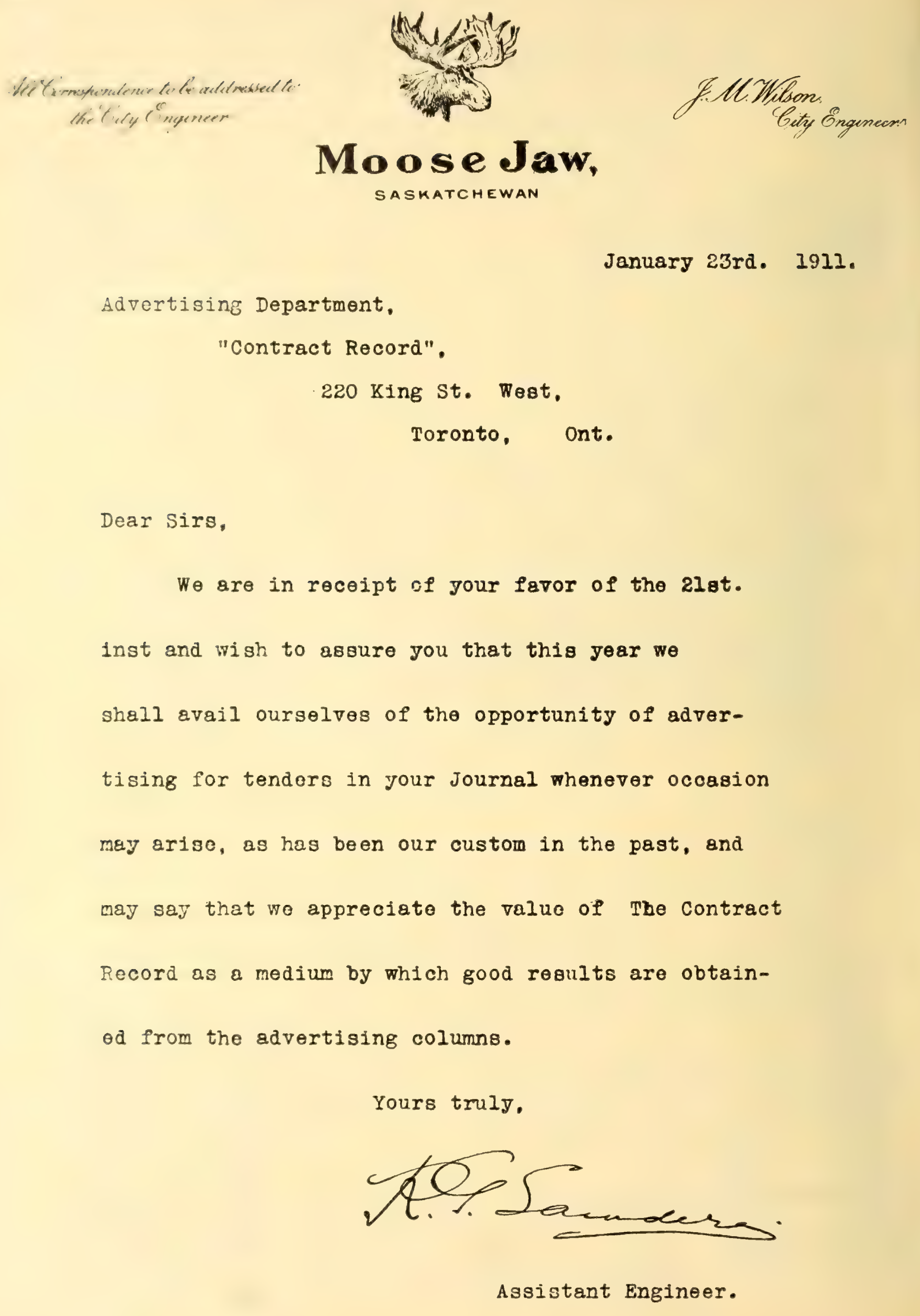


All Correspondence to be addressed to the City Engineer

J. M. Wilson.
City Engineer.

Moose Jaw,
SASKATCHEWAN

January 23rd. 1911.

Advertising Department,
"Contract Record",
220 King St. West,
Toronto, Ont.

Dear Sirs,

We are in receipt of your favor of the 21st. inst and wish to assure you that this year we shall avail ourselves of the opportunity of advertising for tenders in your Journal whenever occasion may arise, as has been our custom in the past, and may say that we appreciate the value of The Contract Record as a medium by which good results are obtained from the advertising columns.

Yours truly,

A. P. Saunders

Assistant Engineer.

The Leading

FIRE BRICK

Of the World

GLENBOIG GARTCOSH

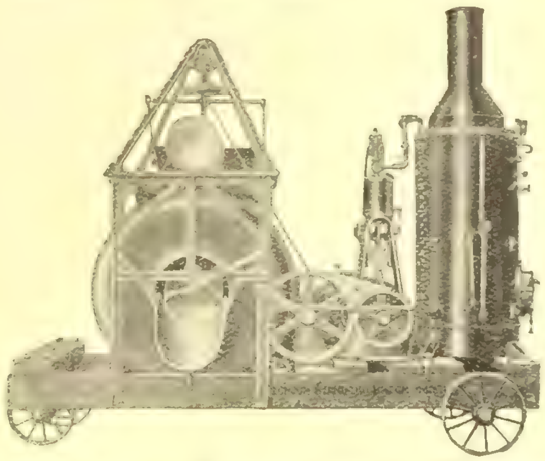
For use in iron and steel works, foundaries, railroad shops and by all furnace users. They possess the three qualities of a perfect fire brick. First, no melting. Second, no cracking and splitting off. Third, high reflective power.

STOCKS carried by all principal dealers

MAKER'S SELLING AGENT

ALEXANDER GIBB

13 St. John St. - MONTREAL, Que.



London Standard Drum Batch Concrete Mixer

Made in several sizes and with any equipment. This machine embodies the latest improvements in Batch mixers and is second to no other machine. Send for catalog stating capacity required.

We ALSO MANUFACTURE the now famous LONDON AUTOMATIC BATCH MIXERS Nos. 1 and 2, also Face-down Concrete Block Machines, Cement Brick Machines, Power Cement Drain Tile Machine, Hand Drain Tile Machine, Sill and Lintel Moulds, Ornamental Moulds, Cement Working Tools and a full line of Concrete Machinery

The London Concrete Machinery Company
19 Marmora Street, London, Canada Limited

We are the Largest Manufacturers of Concrete Machinery in Canada

Manitoba Branch:
W. H. Rosevear, Agent,
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Winnipeg, Man.

Agent for Nova Scotia:
Geo. B. Oland & Co.
28 Bedford Row,
Halifax, N. S.

Agent for B. C.:
A.G. Brown & Co.,
1048 Westminster Ave.,
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Pine Doors

The kind that don't sag and warp

We have equipped our factory with the latest door making Machinery and are able to turn out doors not only of the best quality but at the right price.

Prompt Deliveries **Write for prices**

L. A. Delaplante Co.
Limited
Head Office (Manning Arcade)
24 King St. W. Phone Main 5912 TORONTO
Planing Mills, East Toronto - Phone Beach, 230

Time is Money

By using

"EMPIRE BRAND"

Hardwood Flooring

because of its perfect manufacture, you save time — money. This "Brand" is the standard by which all others are judged. Then why experiment with other Brands when you can have the best?

Send us a trial order and you will wonder why you did not use **"Empire Brand"** long ago.

J. R. Eaton & Sons
Limited
Orillia, Ontario

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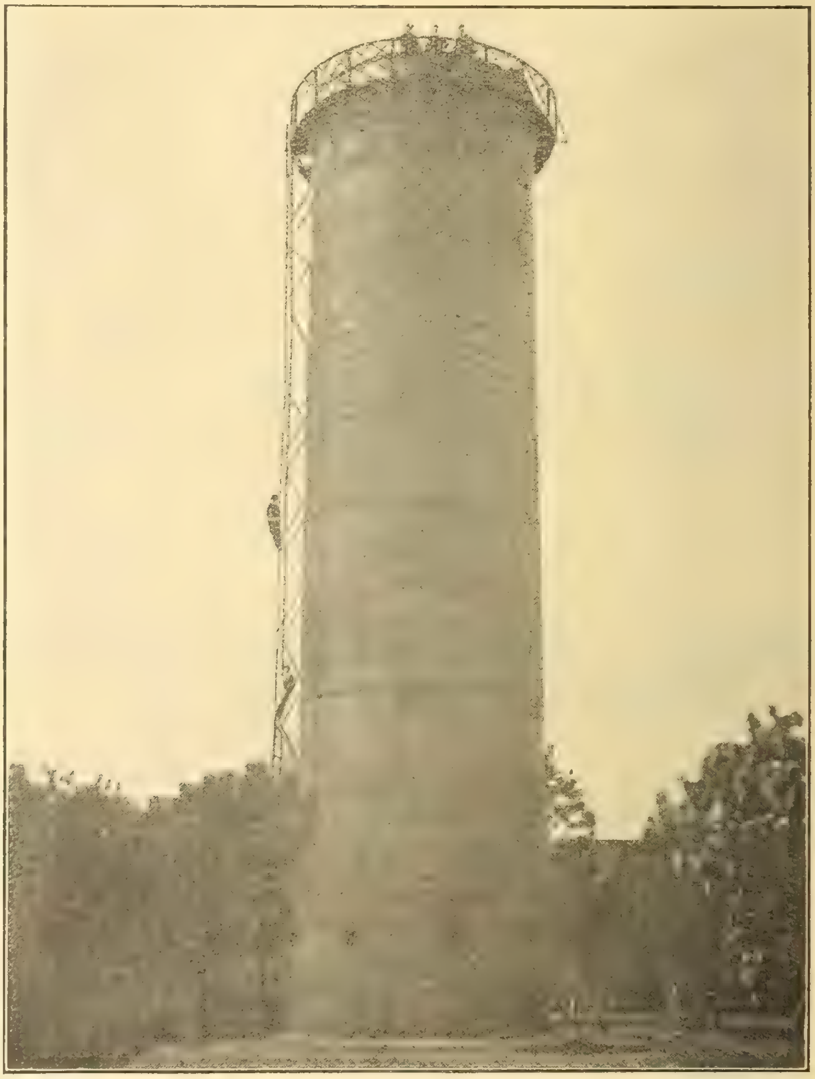
L. C. Spencer, 55 St. Francois Xavier St.

Steel Tanks and Water Towers

Modern Shop equipment, Skilled Mechanics first-class Material, and an able engineering staff, backed by successful experience, enables us to build tanks that give absolute satisfaction.

Send us your inquiries



Water Tower at Whitby, Ont.

The John Inglis Company
ENGINEERS AND BOILERMAKERS Limited
14 Strachan Avenue - TORONTO, CANADA

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Allanburg, Ont.

Tenders are called until February 28th for construction of concrete sidewalks. Specifications at office of J. F. Hansel, clerk.

Edmonton, Alta.

A. J. Latornell, city engineer, has written that the plans and estimates for Rat Creek sewer were not sufficiently advanced to call for tenders.

Fort William, Ont.

Tenders for supply of piglead addressed to the Chairman of the Utilities Committee will be received until February 16th. J. Wilson, city engineer.

Gleichen, Alta.

Tenders addressed to B. S. Corey, secretary-treasurer, will be received until March 16th for drilling, etc., and supplying of materials for waterworks here. Advertisement in "Tenders and For Sale Department" of this issue.

London, Ont.

The construction of sewers on Elizabeth, Elias and Dean streets have been recommended by the board of health and city engineer.

Moose Jaw, Sask.

At a recent meeting of the city council city engineer Wilson filed plans for a system of sewer and water extensions to serve South Hill.

Nelson, B.C.

The council have decided to spend about $5,200 in the extension of sewers, work to commence immediately.

Outremont, Que.

Tenders addressed to J. Kruse, secretary-treasurer, will be received until March 2nd for construction of 2 x 3 brick sewer on Bernard avenue, a distance of 489 lineal yards, and on Davaar avenue, a distance of 700 lineal yards. Plans, etc., at Town Hall.

Prince Rupert, B.C.

Preliminary plans for the new sewerage system have been prepared. The work to be done this year will cost approximately $200,000. Alderman Lynch is interested.

Toronto, Ont.

Tenders were called until February 14th for construction of sewers in several streets here.

The Board of Control have decided to place in the estimates an item of $65,000 for permanent bituminous macadam pavements in Exhibition Park, and have authorized the city engineer to do the work by day labor. There are 40,000 yards to be laid, and the intention is to have the work completed by July.

Vancouver, B.C.

Tenders addressed to Wm McQueen city clerk, will be received until February 22nd for supply of brass goods and galvanized iron pipe. Specifications at office of city waterworks.

Victoria, B.C.

Plans of the new sewer system to cover the entire city, are being prepared by the city engineer. When these plans are ready it is probable that the ratepayers will be called upon to vote upon a by-law to authorize the expenditure of a sum of $250,000.

Victoria, B.C.

In view of the large expenditure on municipal paving, the following will be of interest:

A standard base of cement concrete must be used in connection with all pavements of an asphaltic nature. The concrete foundation will be 4 in. thick for a light asphalt and 5 in. thick for a standard asphalt pavement. The concrete shall consit of 1 part of cement to three of sand and five of gravel or broken stone. The quality of each class of material must be approved by the city engineer. The work will be let on the unit basis; that is, the contractor will be paid a fixed price per squart of pavement, per lineal foot of curb and gutter and per cubic yard of earth excavation and per cubic yard of rock excavation. The amount of earth and rock excavation will be determined by the city engineer and assented to by the contractor before beginning work. The pavement and curb and gutter will each be measured after the work is completed and paid for at the rate fixed. The approximate quantities will be given in the form of tender but such quantities will not be considered except as approximate quantities given with the idea of comparing bids. The quantities used in settlement to be taken and determined by actual measurement.

The contractor will be allowed to submit alternate bids for an asphaltic pavement, which will include sucn pavements as the Worswick asphalt pavement, the Westrumite asphalt pavement, the El Oso asphalt pavement, and Barber asphalt pavement and other similar pavements. The condition of the specifications for standard asphalt pavement as herein provided and applicable must apply to [illegible] pavements.

AWARDED

Hamilton, Ont.

The contracts for supplies for civic department were as follows: The Reinforced Concrete Company, Jackson, Mich., 78-inch concrete pipe at $7.22 per foot; the Hamilton Foundry Company, castings at $1.95 per 100 lbs.; the Canada Cement Co., cement at $1.48 a barrel.

Nelson, B.C.

The tile for the sewer installation recommended by city engineer [illegible] Mackay was supplied by Washington Pipe & Tile Co., Spokane, Wash. Noted in issue of February 1st.

Railroads, Bridges and Wharves

Annapolis Royal, N.S.

Tenders addressed to R. C. Desrochers, Secretary Department of Public Works, Ottawa, will be received until February 21st for construction of two ice piers here. Plans, etc., at above department; at the offices of C. E. W. Dodwell, Esq., District Engineer, Halifax, N.S., E. G. Millidge, Esq., District Engineer, Antigonish, N.S., and on application to the local post-master.

Bridgewater, N.S.

The Davison Lumber Co., of this town, propose to build a railway to carry lumber from Caledonia to Port Medway, a distance of 29 miles. If provincial government grants subsidy they are willing to equip it for passenger traffic.

Burk's Falls, Ont.

Mr. Hogarth, provincial government engineer, with others, examined the proposed site for bridge at foot of Yonge street.

Calgary, Alta.

The city is calling for tenders for the substructure of the new bridges across the Elbow.

The plans for the bridge across the Elbow at Twelfth avenue call for a 30-foot bridge with two 100-foot spans, accommodating a single track. This bridge and a similar one on Second street east are included in the estimates. Estimated cost of both, $55,000. City Engineer Child.

The C. P. R. have under consideration at present the continuation of the double tracking of the line westward from Medicine Hat here. The matter has not been definitely settled, but it is expected that an appropriation for the work will be made soon. The reducing of a number of grades is also under consideration. This will involve an alteration in the course of the line in some places.

Fredericton, N.B.

Tenders are called for up to March 6th by the Department of Public Works, for building the concrete substructure and approaches of Tracy Station bridge over the N. W. Oromocto river, in Gladstone, Sunbury Co. Plans at the store of Ernest A. Tracey, and also at the shop of Mr. A. L. Duplisea at Fredericton Junction.

New Westminster, B.C.

A. C. Powell, Seattle, consulting engineer, has been asked to prepare a report on his recent inspection of harbor facilities. He roughly estimates the cost at $65,000.

Ottawa, Ont.

County Clerk Macnab, Ottawa, writes re the county bridges to be constructed this summer that one will be in Osgood Tp., and two in Huntley. No plans have been prepared as yet; foundation will be concrete; estimated cost, $12,000; engineer in charge, R. W. Farley, 158 Nelson street. Superstructure, all concrete

Owen Sound, Ont.

The plans for the dock are awaiting the approval by the Dominion Government. Mayor Lemon, Mr. E. Box, promoter, are interested.

Point Grey, B.C.

Negotiations are proceeding between the Provincial government, the municipal council of Point Grey, the Canadian Pacific Railway, and the British Columbia Electric Railway, with a view to an agreement between the four bodies interested having for its object the widening of King Edward and Chaldicott roads to 132 feet and their continuation from the point where they meet the city boundary right through Provincial University. If satisfactory arrangements can be made with the companies, a double car track will also be built, with connections from all parts of the city.

St. John. Que.

A delegation from Iberville and St. John's waited upon the provincial government with regard to the proposed new cement bridge across the Richilieu river. The government promised to pay half the balance of the cost after the grant from the federal government had been received, up to the sum of $60,000.

St. John, N.B.

At the civic elections in April next the ratepayers will vote on a plebiscite as to the advisability of spending $300,000 on a bridge across the harbor.

Trail, B.C.

Contracts for the steel bridge across the Columbia will be let almost at once.

Toronto, Ont.

Construction is expected to commence in about three months on the Canadian Northern Ontario Railway east from Port Arthur to overcome the gap in the system in New Ontario of 500 miles between Sudbury and Port Arthur. It is intended to conduct the laying of the steel from both terminals. It will take about three years to complete construction and have the line ready for traffic.

Victoria, B.C.

The provincial government and the G. N. R. have completed an agreement settling all outstanding difficulties regarding the False Creek foreshore and tideflat property. The immediate result will be the commencement of work by the Great Northern in the carrying out of its large plans for improvement and establishment of terminals in the False Creek basin.

AWARDED

Winnipeg, Man.

J. D. McArthur, railway contractor, of this city, has been awarded the contract for building the unfinished portion of the Algoma Central Railway in Nothern Ontario, from the present end of the steel land, to a junction with the main line of the C. P. R. near White River. The present contract figures up to $1,000,000.

Public Buildings, Churches Schools, etc.

Battleford, Sask.

The time for receiving tenders for fittings for public building here has been extended to February 28th. R. C. Desrochers, secretary, Public Works Department, Ottawa.

Belleville, Ont.

Tenders are called until March 4th for construction of Y. M. C. A. here, Architect, C. J. Gibson. Advertisement in "Tenders and For Sale Department" of this issue.

Berlin, Ont.

The report of Dr. Bruce Smith recommended the erection of a new wing to the Berlin-Waterloo Hospital. It is stated that steps will be taken at once towards its erection.

Brantford, Ont.

The Buck property on Brant avenue is reported to have been chosen as a prospective site for the new armories.

Brandon, Man.

Plans for the new East Ward School have been prepared and tenders will be called within a week or so. Estimated cost, $35,000.

The site for the new Normal School has been chosen between Tenth and Twelfth streets. Estimated cost of building to be erected, $50,000.

Tenders will be called at once for erection of fire hall to take the place of the one on Seventh street. Estimated cost, $25,000. Interior—reinforced concrete.

Caligary, Alta.

Under date of last information the contract for erection of new St. Andrew's Church had not been awarded. Estimated cost of building, $20,000; of equipment, $3,000. D. S. McIlroy, Tribune Block, Calgary, is architect. Rev. A. Mahaffy, pastor.

Chatham, Ont.

The Board of Education will be asked to consider the necessity of the erection of a new school on Park avenue west. Dr. D. E. Russell is interested.

Galt, Ont.

The hospital board have requested the council to submit a by-law to authorize $30,000 to be spent in erecting an addition, etc., to hospital here.

Havelock, N.B.

Tenders addressed to B. W. Corey, secretary, will be received until February 28th for erection of school house. Plans, etc., with above mentioned.

Joliette, Que.

Tenders addressed to the Director of Contracts, Department of Militia and Defence, Ottawa, will be received until February 21st for the following improvements to the Armoury here: cement sidewalk, roadway, runway for carts over sidewalk, levelling and seeding, ornamental iron fence and wood fence. E. Fiset, colonel.

Kitsilano, B.C.

The Order of Oblates of Mary Immaculate have secured a building site for a building to be used as a parish hall, school and church, plans for which will be prepared at once. Adjacent to this site additional land has been secured for a permanent church in the future.

Listowel, Ont.

Tenders addressed to R. C. Desrochers, Secretary, Department of Public Worws, will be received until February 27th for erection of public building here. Plans, etc., on application at the post office, Listowel, Ont., and at the office of H. J. Lamb, Esq., District Engineer, London.

Monteral, Que.

The Convent of St. Joseph was destroyed by fire on the 8th inst. Estimated loss, about $80,000.

Tenders are called until February 20th for fireproof construction of a double school for boys and girls. Contract to be divided in four parts. Two private residences for teachers will be built at Cote Visitation Arrond; No. 2 Rosemount. Plans, etc., at office of Alphonse Content, architect, 11 Place d'Armes Hill.

Mitchell, Ont.

Tenders addressed to R. C. Desrochers, Secretary, Department of Public Works, will be received until March 1st for construction of public building here. Plans, etc., at the office of Mr. H. J. Lamb, District Engineer, London, Ont., at the Post Office, Mitchell, Ont., and at above department.

Moose Jaw, Sask.

The congregation of St. Andrew's Presbyterian Church have decided to build a new church. Messrs. W. F. Heal, and A. W. Maybery, are on building committee; Mr. J. A. McPherson, financial secretary.

Montreal, Que.

Tenders are about to be called for the extensive alterations, including the putting on of another storey to the Montreal post office. The building is to be fireproof. Architect, Mr. Theo. Daoust, 90 St. James street, Montreal.

Orillia, Ont.

It is proposed to enlarge the present Y. M. C. A. building, at an estimated cost of $10,000. President, Mr. G. H. Clark; Mr. J. J. Thompson is interested.

Ottawa, Ont.

Tenders are being called for the erection of Bethany Presbyterian Church, J. A. Ewart, architect.

It is probable that a 6-room addition will be built to the Mutchmor street school, at a cost of about $50,000.

Peterborough, Ont.

Tenders were called by T. F. Matthews, until February 15th for erection of Murray street Baptist church. Architects, Burke, Horwood & White, 28 Toronto street, Toronto.

Strassburg, Sask.

Tenders are called until February 18th for erection of 4-room school here. Plans, etc., at office of the architects, Messrs. Storey & Van Egmond, Regina.

Stratford, Ont.

Rev. Hugh Ferguson, Sheriff Magwood and others are on the building committee for Children's Shelter.

St. Boniface, Man.

Archibshop Langevin is executive head of the committee appointed in regard to erection of training school for Roman Catholic priests. Noted in issue of February 1st.

St. Catharines, Ont.

Plans for a building to be used as a gymnasium and assembly hall will be received by the Collegiate Institute Board until February 21st. A. E. Coombs, secretary managing committee.

Thorold, Ont.

Tenders are called until February 27th for construction of a complete library building here. A. E. Nicholson, O. A. A. architect, St. Catharines.

Toronto, Ont.

The committee for Newsboy's Home have purchased 20-22 Pembroke street, which will be altered at an estimated cost of about $12,000.

Tenders addressed to the Chairman, Board of Control, will be received until February 28th for erection of Women's Building on Exhibition grounds. Plans, etc., at office of Mr. Geo. W. Gouinlock, architect, Temple Building, Toronto. Advertisement in "Tenders and For Sale Department" of this issue.

Permit was issued to the Toronto General Hospital Board for erection of Nurses' Home, $250,000.

Toronto, Ont.

Tenders addressed to Messrs. Burke, Horwood and White, architects, 28 Toronto street, will be received until February 18th for the various trades required in the erection of the Broadview branch of the Y. M. C. A.

Vancouver, B.C.

Tenders have been called for the excavation of the several schools under consideration.

The time for receiving tenders for erection of court house here has been extended until February 21st by the Public Works Department. F. G. Gamble, public works engineer.

The recently erected Mountain View Methodist Church here was destroyed by fire. Estimated loss, $20,000. It will be rebuilt. The structure was only completed two months ago.

Verdun, Que.

The Verdun Catholic Church will be built this summer. The basement was constructed some years ago, and is at present being used for services. Sufficient money has now come to justify the completion of the building.

Winnipeg, Man.

Messrs. W. and E. Maxwell, Montreal, are preparing plans for the new country club at St. Giles.

Tenders addressed to the Chairman, Board of Control, will be received until February 23rd for supply of labor and materials for erection of Public Bath House in Selkirk Park. Plans, etc., at office of Mr. William Bruce, architect, 222 McDermott avenue. M. Peterson, secretary.

Residences

Brandon, Man.

The plans are now ready for the new manse for St. Paul's Presbyterian brick church, the contract for which will be let shortly. The building will cost $8,000, and it is expected will be ready by mid-summer.

Oak Bay, B.C.

Tenders were called until February 7th for erection of residence here. S. Maclure, architect, 19 Green Block, Victoria.

Ottawa, Ont.

J. McFarlane, Bank street, is having plans prepared for a large apartment house on Lisgar street.

Victoria, B.C.

Building permits were issued as follows: Thomas Perkins, $2,500; A. McCrimmon for two dwellings on Camosun street to cost $2,800 each.

Winnipeg, Man.

Tenders wanted for the construction of Home on Lot 95, Parish of St. Paul, for Mr. W. B. U. Sterling. Plans, etc., at 413 Somerset Building.

Permits issued recently are: E. Noe, 2 houses on the north side of Stella, $6,000; Johnson & Bjonson, dwelling, on tie east side of Alvestone, $2,600; Kristjanson & Bjornson, dwelling on the east side of Alverstone, $3,000.

Business Buildings and Industrial Plants

Brantford, Ont.

The site of the building for the Royal Loan and Branford Company is being prepared.

Brigden, Ont.

The Dominion Cooperage Company, Limited, whose plant was recently destroyed by fire, will build again. Work will be done by local contractors.

Barrie, Ont.

H. H. Hastings, Toronto, representing a company who intend to manufacture rubber goods, is negotiating with the town in regard to locating here.

Beauport, Que.

The Standard Construction Company, of Montreal, has nearly completed the construction of the stone crushing plant here. The work will have taken three months and will cost about $35,000.

Calgary, Alta.

The McNair Fruit Company will commence very shortly the erection of a large new building on Ninth avenue. The building will have a frontage of about 50 feet and will cost about $40,000.

Edmonton, Alta.

Tenders will be called shortly for the 6-storey block to be erected for Robert Tegler. Estimated expenditure, $100,000. H. A. Magoon, architect.

Colonel Jas. Walker intends building a big block on his property on Seventh avenue. Plans are being made for a lahge business block to cost $100,000.

Galt, Ont.

P. W. Gardiner & Son, it is stated, will erect two more additions to their planing mill here.

Ladner, B.C.

The plant of the Jervis Inlet Lumber Company near the mouth of the Fraser river was destroyed by fire on the 1st inst. Loss, about $20,000.

London, Ont.

The London Foundry Company will erect a large addition to their foundry here. Ald. Mitchell, chairman manufacturers' committee.

It is reported that one of the biggest electrical equipment concerns of England, which secured the contracts for the installation of motors in a number of local factories, is contemplating the establishment of a Canadian branch here

Millbrook, Ont.

The flour mill owned by Mr. Geo. [illegible] was destroyed by fire on the 12th inst. Estimated loss, $12,000.

Moose Jaw, Sask.

We are informed that the firm (leather manufacturers) enquiring about location here from Board of Trade, are J. Eveleigh & Co., Montreal, and that having secured suitable presmises, it is not probable that they will build for some time.

Montreal, Que.

It is reported that the building on the southwest corner of Peel and St. Catharines streets will be torn down and replaced by a modern structure.

The C. P. R. will shortly call for tenders for timber in connection with the erection of a station here, also for renewal of tracks and extension of terminal buildings.

Permits were issued to the C. P. R. for their new freight sheds, which are to extend from Lacroix street, near the Place Viger station, to Montcalm street, $100,000.

Ottawa, Ont.

John McFarlane will make extensive alterations to his store on Bank street.

W. J. Spratt is erecting a commercial building on the corner of Bank and Glen avenue. It will be a large brick building with stone front.

W. J. Spratt has begun the excavations for the branch building for the Bank of Ottawa in Ottawa South. Mr. D. M. Finnie, assistant general manager.

Regina, Sask.

M. W. Sharon is preparing plans for the 3-storey building to be erected for Mr. A. Mowat. Construction will start in the spring.

Sherbrooke, Que.

The offices of the Singer Machine Co., etc., were damaged to the extent of about $10,000 on the 8th inst.

St. Timothee, Que.

The Cotton Print Co., Ltd., have acquired a portion of the town site of the Canadian Light, Heat & Power Company here. The erection of the plant, it is stated, will be started in the early spring.

Toronto, Ont.

Tenders are requested for erection of a freight shed on Yonge street dock. Plans, etc., at office of the Niagara Navigation Company, Traders Bank Building.

The Home Bank of Canada will begin operations early in the spring on the branch to be erected at the northwest corner of Broadview avenue and Elliott street.

Victoria, B.C.

The cost of the proposed office building for the Dominion Trust office building is estimated at about $135,000. Work will start in about four weeks. W. R. Arnold, general manager, is also planning for the erection of James' Bay building. Noted previously.

Virden, Man.

The flour mill here, owned by Hubbard, Nichols & Co., was destroyed by fire on the 7th inst. Estimated loss, $25,000.

Winnipeg, Man.

The Confederation Life Association have plans prepared for erection of their building on Main street.

The steam turbine power station noted in issue of January 25th will be constructed of steel, concrete and brick, two storeys and basement, 114 x 122.

Tenders addressed to James Chisholm & Son, architects, Enderton Building, will be received until February 17th for

(Continued on page 37)

Tenders and For Sale Department

For Sale—Second Hand

No. 8 Austin Gyratory Crusher.
No. 6 and No. 3 Austin complete plant.
No. 3 Austin and 2 No. 6 Gates and No. 5 "B."
70-ton Vulcan Steam Shovel, 2-yard.
50-ton Bucyrus Steam Shovel, 1¾-yard.
Loco. Crane, with 1¼-yard Clam Shell.
Little Giant Traction Steam Shovel, 1¼ yard.
Hayward Orange Peel Buckets, 1 and 1½-yd.
Concrete Mixers, Steam Rollers, Air and Steam Drills, Air Compressors, Locomotives, Dump Cars, etc.

All our goods we fully guarantee.

Send for our February Booklet.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

St. Catharines Water Works

TENDERS

Sealed tenders addressed to "The Chairman Water Works Commision," endorsed "Tenders for Pipe and Specials"—Gate Valves—Pig Lead, will be received up to noon on **Tuesday, February 28th, 1911,** for the cast iron pipe and special castings 12-in. to 36-in., Gate Valves 4-in. to 36-in., and pig lead required.

Specifications, forms of tender and full particulars may be obtained at the office of The Commission, City Building.

The Commission does not bind itself to accept the lowest or any tender.

ALEX. MILNE,
Superintendent.

St. Catharines, Ont., Feb. 2, 1911. 6-7

Town of Dauphin

Province of Manitoba

Tenders for Reinforced Concrete Highway Bridge

Sealed tenders addressed to the undersigned Town Clerk will be received up to 8 p.m. **Saturday, the 25th day of February, 1911,** for all labor and material necessary for the construction of two reinforced concrete highway bridges to be constructed in the Town of Dauphin.

Plans and specifications will not be sent out, but may be seen at the Town Clerk's office, Dauphin, Man., or at Provincial Public Works Department, Winnipeg, Man.

The lowest or any tender not necessarily accepted.

H. F. CALDWELL,
Mayor.

A. H. F. STELCK,
Chairman Public Works Committee.

J. W. JOHNSTON,
Town Clerk.

6-8

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No ten cents extra

ARCHITECT, highest qualifications and experience, would take charge of office or consider partnership. The West preferred. Box 200, Contract Record, Toronto, Ont. 4-7

Tenders

Bulk tenders will be received by the undersigned until noon of **March 4th,** for the construction of new Y. M. C. A. building, Belleville, according to plans and specifications furnished by C. J. Gibson, architect, Toronto. Plans may be seen at the Y. M. C. A. rooms, Front street. The lowest or any tender not necessarily accepted.

7-8 J. L. HESS, Secretary.

TENDERS WANTED

The Quebec & Saguenay Railway

Tenders will be received up to **March 2nd, 1911,** at 5 o'clock p.m., by the undersigned, for the construction of about 56 miles of the above railway, from Cap Tourmente to Murray Bay Wharf, divided up into sections of ten miles.

A certified cheque amounting to $20,000 for each ten mile section tendered for must accompany each tender.

Forms of tender may be obtained and specifications and plans examined at the office of J. F. Guay, Civil Engineer, Morin Building, Quebec.

The right is reserved by the company to reject any or all tenders.

6-6 (Signed) J. F. GUAY.

Tenders

Foundry and Machine Shop in the Town of Welland, in the County of Welland For Sale By Tender

Foundry and Machine Shop in the Town of Welland, in the County of Welland For Sale by Tender.

Sealed Tenders marked "Tender for The Robertson Machinery Company, Limited," will be received by the undersigned up to twelve o'clock noon on **Tuesday, the 21st day of February, A.D., 1911,** for the purchase, en bloc, of the assets of The Robertson Machinery Company, Limited, Welland, Ont., which is unusually well situated, being on the Grand Trunk Railway, with switching rights to all other railways, consisting of:—

Land, Factory site, part of Block W., about 4 acres, with right to switch, including building 70 ft. x 112 ft. —besides store rooms, motive power, cupula, line shafting, etc.		$11,290.00
Iron working machinery		3,945.00
Wood working machinery		250.00
Pullies		641.00
Small tools:—		
Machine shop	$1,000.00	
Foundry	511.00	
		1,511.00
Hoisting engines and parts		1,500.00
Foundry merchandise		632.00
General merchandise		2,500.00
Office furniture and fixtures		275.00
		$23,544.00

An inventory will be mailed upon request. The plant has not been shut down. It is excellently located, and has been doing a good business.

Each tender must be accompanied by a certified cheque, payable to the Assignee, for the sum of one thousand dollars, the balance of the purchase price to be paid within thirty days, without interest, when immediate possession can be given.

Dated this 1st day of February, A.D. 1911.

J. F. GROSS, Asignee,
Welland, Ont.

6-7

City of Strathcona

(Alberta)

Tenders for

Engine, Boilers and Generators

Tenders addressed to David Ewing, Chief Engineer power house, Strathcona, Alta., for the above machinery, will be received until noon, Wednesday, March 1st, 1911. Specifications may be obtained upon application to the undersigned.

A. J. McLEAN,
City Engineer.

Strathcona, Alta., Jan. 16, 1911. 4-8

Town of Gleichen, Alberta

Waterworks and Sewers

Tenders are invited and will be received by the undersigned, not later than **16th March, 1911,** for the following:—

1. Drilling and casing an eight-inch well.
2. Supplying about 60 tons of cast iron pipes and specials, or alternatively an equivalent quantity of steel pipe.
3. Supplying and erecting an elevated steel tank.
4. Supplying gate valves and fire hydrants.
5. Supplying about 3,400 feet of vitrified tile sewer pipe.
6. Supplying manhole castings.

Specifications, forms of tender and full particulars may be obtained from The John Galt Engineering Company, Consulting Enginetrs, Winnipeg and Calgary.

The Corporation of the Town of Gleichen do not bind themselves to accept the lowest, or any tender.

B. S. COREY, Secretary-Treasurer..

Gleichen, Alberta, Febuay 15, 1911. 7-7

Tenders for

Exhibition Building

Bulk tenders only will be received by registered post, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on **Tuesday, February 28th inst.,** for the erection and completion of the Women's Building on the Exhibition Grounds, Toronto, immediately south of the Manufactures' Building.

Plans may be seen and specifications and all information in relation thereto obtained at the office of Mr. George W. Gouinlock, architect, Temple Building, Toronto.

Provisions of City By-laws in relation to tendering must be trictly observed, or the tenders may not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.

City Hall, Toronto,
February 10th, 1911. 7-7

For Sale

One second-hand No. 1 Smith Concrete Mixer with engine and boiler complete.
One second-hand 7 x 12 Hoisting Engine, 3 drum d.c. and boiler complete, nearly new.
One 5-ton derrick with cables and sheaves.
One ¾-yard Clam Shell Bucket, nearly new.

Apply to
A. J. CROMER,
Brantford, Ont.
7-8

Tenders for Bridge

Tenders will be received by the undersigned up to 6 o'clock p.m., Saturday, the 4th day of March, 1911, for the erection of a reinforced concrete bridge, single span over the Clyde River at a point about 3 miles north of Lanark Village. Bridge about 70 feet long.

Plans may be seen at the office of the undersigned at Lanark, or tenderers may submit their own plans and specifications.

Deposit of ten per cent. to accompany each tender, which will be returned if tender not accepted.

The lowest or any tender not necessarily accepted.

Dated this 2nd day of February, 1911.

J. BOYD CALDWELL,
Chairman of Roads and Bridges Com.
Lanark, Ont. 6-9

City of Winnipeg

Electrical Distribution System

Tender for Superstructure, Sub-Stat on No. 1

Sealed tenders on prescribed form, addressed to the Chairman of the Board of Control, Winnipeg, Canada, and marked on the envelope "Tender for Superstructure Sub-tation No. 1," will be received at the office of the undersigned up till 11 a.m. on **Monday, February 20, 1911**, for the building of supertructure of this station on King street near Notre Dame avenue, according to specification No. 57, copy of which, along with plans of building and form of tender, may be obtained by bona fide tenderers at the office of Smith, Kerry & Chace, Poyer Engineers, Carnegie Library, Winnipeg.

Each tender must be accompanied by certified cheque for five per cent. of the amount of tender.

The city reserves the right to reject any or all tenders, or to accept any bid which appears advantageous to its interests.

M. PETERSON, Secretary.

Board of Control Office,
Winnipeg, February 6, 1911. 7-7

Business Buildings and Industrial Plants

(Continued from page 35)

erection of the Sterling Bank Building, corner Portage avenue and Smith street. Plans, etc., with above.

Tenders are called until February 20th for building of superstructure of substation No. 1 on King street. Advertisement in "Tenders and For Sale Department" of this issue. M. Peterson, secretary.

It is announced that the G. N. R. will build its depot on Paulin street between Ross and Pacific avenues and complete it within a year. It is stated that all plans for this are complete and work will commence at once.

Yorkton, Sask.

Architects are invited to submit competition plans to Fred Hukins, secretary-treasurer, for a proposed hotel to be erected here.

AWARDED

St. John, N.B.

The contract for construction of Telephone Exchanges here was awarded to J. H. Dorley, St. John.

Victoria, B.C.

The contract for erection of 2-storey brick building on Fort street has been let to A. H. Mitchell, 2902 Rock Bay avenue. Architects, James & James.

Power Plants, Electricity and Telephones

Edmonton, Alta.

It is stated that a firm having headquarters at the Pacific coast will apply for franchise to supply natural gas from a source some 25 miles from the city.

Eglinton, Ont.

Tenders addressed to W. C. Norman, town clerk, will be received until February 16th for supply of about 1,000 30-ft., 100 35 ft., and 50 40 ft. cedar poles for an electric light line in the town of North Toronto. A. J. Brown, Mayor.

Fort William, Ont.

Tenders addressed to the Chairman of Utilities Committee, will be received until March 2nd for supply of "Line Material." A. L. Farquharson, manager.

Fredericton, N.B.

A company to be known as the St. John River Electrical Power Company will seek legislation for power to erect a dam across the St. John river about 40 miles above here to develop electricity for light, heat and power purposes, etc. Mr. John E. Stewart, Andover, is interested.

Hamiota, Man.

Tenders will be received until February 23rd for $5,000, 4 per cent., 20-year telephone debentures. J. Andrew, secretary-treasurer.

Hamilton, Ont.

The Board of Control will advertise for tenders from engineers for an estimate of cost of installing a house and street lighting system.

Kingston, Ont.

W. W. Sands, City Clerk, states that about $13,000 will be expended for improvements to the electric light plant. Engineer, C. C. Folger, of Kingston.

Montreal, Que.

Plans will be ready by the end of March for the new power house for the Saraguay Company. They will include the specifications for two steam turbines of 4,500 maximum h.p. capacity each, boilers and general equipment. Mr. Charles Brandies, civil engineer, is in charge.

Sherbrooke, Que.

The by-law authorizing city council to borrow $100,000 for the construction of dam and development of the "Drop-off" power near Rock Forest, was carried. Messrs. Ross & Holgate, Montreal, are engineers in charge.

St. Boniface, Man.

The [illegible] Company's offer for supplying this city with electric energy for light, heat and power purposes, has been practically accepted. The company offers to supply power on a sliding scale of rates, ranging from $18 a horse-power down to $15, according to the quantities taken. An additional $2 per horse-power will be charged if the company installs the step-down transforming station. The contract runs for ten years, subject to renewals and revision of prices and reduction by the city of Winnipeg, thus leaving this city free to compete for contracts with companies that may wish to take power.

Victoria, B.C.

Wm. M. Northcott, purchasing agent, has been instructed by city council to shortly call for tenders for supply of 300 iron standards to be used in the extension of cluster lighting system.

Winnipeg, Man.

Colonel Ruttan, city engineer, is drawing plans for the proposed extension of the street car lines.

AWARDED

Kingston, Ont.

A contract for the supply of cement has been awarded to the Frontenac Lumber & Coal Co., Kingston, Ont., at $1.59 per barrel of 350 lbs., f.o.b. car, or in their storehouse. Other tenders received were S. Anglin & Co., Kingston, Ont., at $1.62; and John Corbett, Kingston, Ont., at $1.64.

Regina, Sask.

The order for supply of two double truck cars, complete with quadruple motor equipment and air brake, and also four single truck cars with double motor equipment (the cars to be built by the Brush Electrical Engineering Co., Ltd., London, Eng.), was placed with the Canada Ford Company, 485 James street, Montreal. This was erroneously reported in issue of January 11th as having gone to the Ottawa Car Company.

Winnipeg, Man.

The Canadian General Electric Company have been awarded the contract for supplying the steam turbines and generators for the new plant of the Winnipeg Street Railway Company on Mill street. Three 3,000 kilowatt Curtis turbines will be installed. Total cost of equipment, $475,000. Pratt & Ross, 289 Garry street, architects and engineers.

Miscellaneous

Fort William, Ont.

Tenders for lumber will be received by city clerk until March 2nd. Information at office of city engineer, John Wilson.

Tenders addressed to the Chairman of Utilities Commission will be received until March 2nd for supply of 280-35 ft. and 20-40 ft. cedar poles, f.o.b. local tracks. Delivery to be not later than May 1st, 1911. W. I. Farquharson, manager.

Mace's Bay, N.S.

Hon. John Morrissy, Chief Commissioner of Public Works, advertises tenders until the 27th of February, for the construction of a sea protection wall at Mace's Bay, in the parish of Lepreaux, Charlotte Co. Plans for this are open for inspection at the law offices of Hon. Surveyor General Grimmer in St Stephen. Dr. H. I. Taylor, M.P.P., in St. George, and Mr. T. A. Hartt, M.P.P., in

Saint Andrews, as well as at the office of the Board of Works here.

Ottawa, Ont.

The Board of Control have decided to purchase a combination engine and hose wagon, the engine to have a capacity of 750 gallons. Tenders will be called for.

The following contracts have been awarded in the Public Works Department: Mount Forest, public building, to George A. Proctor, of Sarnia, for $17,666; Quebec custom house, restoration and addition, to Jos. Gosselin, of Levis, and Emile Dube, of Fraserville, for $135,369; Elora, Ont., post office fittings, Office Specialty Co., Toronto, for $775; Lindsay, Ont., post office interior fittings, to Deisenroth Contract Co., Toronto, for $1,717; Toronto postal station B., interior fittings, to Deisenroth Contract Co., Toronto, for $1,132; Port Burwell, Ont., breakwater, to M. J. Hogan, of Westmount, for $157,500; Fergus, Ont., post office fittings, to Office Specialty Co., Toronto, $775; Lunenbery, N.S., public building, electric lighting, to Empire Electric and Manufacturing Co., Ottawa, for $863; Shigwake, Que., wharf extension, to Thomas P. Charleston, Ottawa, $9,385.

Quebec, Que.

Quebec will make a bid for a big shipbuilding plant, and one which is prepared to undertake the construction of the largest warships. Enquiry has been recieved as to what privileges the city would be willing to grant to a company which would establish a shipbuilding plant at the port of Quebec. It was decided to offer an exemption from taxes for twenty years as a liberal bonus, should the company locate here. Hugh Rusell is interested.

Toronto, Ont.

Recent building permits include: H. J. Atkinson, 2½-storey brick dwelling s.w. corner Williamson road and Hambly, $4,500; Mrs. Florence Hill, 2 detached 2½-storey brick dwellings, on east side Hawthorne, $7,600; G. Millar, 5-storey brick warehouse on Richmond street east, $30,000; Dr. Wm. Kerr, 2-storey and attic brick dwelling on east side Lansdowne, $5,000; David Madely, 1 pr. semi-detached 2½-storey brick dwellings on north side King street west, $5,500; J. M. Chalmers, 5 attached 2½-storey brick dwellings on Chalmers avenue, $16,000; J. J. Tracey, 2-storey brick dwelling on west side St. Clarens, $5,000; The Dominion Bank, 2-storey brick bank, store and office, southwest corner Lee and Queen, $11,500; The Dominion Bank, 2-storey brick bank and offices, southeast corner St. Clair and Vaughan, $8,500: The Dominion Bank, 2-storey brick bank, stores and offices, southeast corner Bloor and Dovercourt road, $13,500; J. E. Johnston, 2 pair semi-detached 2-storey brick dwellings on Queen street east, $4,500; G. A. McTaggart, 4 pair semi-detached 2½-storey brick dwellings, northwest corner Sherbourne and Wilton crescent, $20,000; Lankin Bros., 3 pair semi-detached R. C. dwellings, brick fronts, on Curzon, $9,600; Independent Glass Producers, Limited, 2-storey and metallic siding factory and packing house, near Gerrard, on west side Carlaw avenue, $20,000; Dr. R. H. Conboy, 2-storey and attic brick dwelling, near Rusholme, on south side Bloor street west, $5,200; W. H. Edwards, 2½-storey brick dwelling, on east side Christie (Bracondale), $5,000; L. E. Price, 1 pair semi-detached 2-storey brick dwellings, on south side Shanley, $5,000.

Vancouver, B.C.

Building permits were granted as follows: J. G. Wonder, Robson and Broughton streets, $15,000; W. J. Harrington, 2525 York street, $7,500; Currie & Wallace, 2315 Sixth avenue west, $3,600; W. C. Holtz, 1165 Thirteenth avenue west, $6,000; T. B. Winship, 1736 Seventh avenue west, two houses, $4,000; G. Ellis, 3263 Second avenue west, $3,000; H. M. Daly, Cordova street, $12,000; J. R. Sharp, 765 Thirteenth avenue west, $2,400; K. Fraser, 1375 Eleventh avenue west, $4,000; D. McDonald, frame dwelling, 3110 Second avenue west, $2,800; T. A. Pepine, frame dwelling, 1749 Harris street, $2,500; Parker & Allen, frame dwelling, 2177 Third avenue west, $2,500; Wm. Dalby, frame stores and dwelling, 1202 Woodland drive, $5,000; T. W. Chandler, frame dwelling, 1055 Barclay street, $3,500; G. E. Hiscock, frame apartment, 638 Prior street, $10,000;Dissette & Fraser, small residence, 1375 Eleventh avenue west, $4,000; H. M. Daly, brick stores, Cordova street, $12,000; Geo. Ellis, frame dwelling, 3263 Second avenue west, $3,000; T. B. Winship, frame dwellings (2), 1627 Twelfth avenue east, $4,000.

New Companies

British Canadian Paper Mills, Limited, Montreal, Que., incorporated, capital, $500,000. Incorporators, Hon. T. H. Berthiaume, publisher; P. Lacoste, advocate; T. Bienvenu, bank manager, all of Montreal, Que.

Belgo-Canadian Steel, Limited, Montreal, Que., incorporated, capital, $550,000. Incorporators, E. Van Acker, importer; A. Menager, engineer; F. A. Beique, advocate, and L. J. Beique, all of Montreal.

Superior Construction Company, Ltd., Sault Ste. Marie, incorporated, capital, $100,000. Incorporators, P. T. Rowland, barrister; W. Calder, estate broker, both of Sault Ste. Marie, Ont.

The Albemarle Zinc Company, Limited, London, Ont., incorporated, capital, $450,000. Incorporators, C. T. Campbell and S. Wollverton, physicians, C. B. Hunt, manager, and J. C. Judd, all of London.

The Emsdale Lumber Company, Limited, Emsdale, Ont., incorporated, capital, $40,000. Incorporators, J. F. McDonald, clerk, F. W. Brooks, lumberman, and G. Streatfield, farmer, all of Perry Tp.

The Bromsgrove Guild (Canada) Ltd., Montreal, Que., incorporated, capital, $100,000. Incorporators, R. O. McMurtry, advocate, F. G. Bush, bookkeeper, both of Montreal, Que.

The Climax Good Roads Machinery Company, Limited, Hamilton, incorporated, capital, $40,000. Incorporators, J. Robinson, manufacturers, W. J. Robinson, drug clerk, both of Hamilton, Ont.

Chapman Brick Company, Limited, Toronto, Ont., incorporated, capital, $40,000. Incorporators, Chas. Chapman, brick manufacturer, and A. F. Lobb, barrister, both of Toronto.

The Durable Box Company, Limited, Toronto, Ont., incorporated, capital, $40,000. Incorporators, O. H. King, barrister, T. S. Webb, bookkeeper, both of Toronto.

The Pedlar People, Limited, Oshawa. Ont., incorporated, capital, $500,000. Incorporators, M. H. Luewig, K.C.; A. W. Ballantyne, and C. F. Ritchie, barristers, all of Toronto.

Electrical Maintenance & Repairs Co., Ltd., Toronto, incrporated, capital, $40,000. Incorporators, E. R. Lynch, solicitor, E. K. Williams, student, both of Toronto.

The Gravenhurst Hardware Company, Limited, Gravenhurst, incorporated, capital, $20,000. Incorporators, R. Wade and J. Scott, bank manager, Orillia, Ont.

Business Notes

Edwin Jackson, electrician, Montreal, has registered.

L. Villani, contractor, Montreal, is reported to have assigned.

L. Villanie, contractor, Montreal, Que., is stated to have assigned.

Bouchard & Guilbault, contractors, Montreal, have registered.

Belding Lumber Co., Ltd., Toronto, are reported to have assigned.

The Canada Electric Co., Montreal, are reported to have dissolved.

E. Dufresne, contractor, St. Laurent, Que., is reported to have assigned.

Cadieux & Briard, plumbers, Montreal, are reported to have dissolved.

Twin City Sand Company, Fort William, are reported to have dissolved.

The Eureka Lumber Co., Ltd., Bathurst, N.B., are applying for charter.

The Louisa Lumber Co., Lachute, Que., Arch. McFaul, J. McFaul, H. Morrison and W. Bery, registered.

An English synidcate, with vast capital, is said to be seeking to purchase the Dominion Power and Transmission Company, of Hamilton. It is reported to be willing to pay a sum in excess of the Dominion Company's capitalization, which is $25,000,000, for the Decew Falls plant, the local distributing plant, the Hamilton street railway and the various suburban lines owned by the company.

The British Columbia Gazette gives notice of the incorporation of the following companies: Victoria-Vancouver Lime and Brick Company, Limited, capital, $100,000; The Alberni District Electric Light and Power Company, Limited, capital, $25,000; Consolidated Electric Heaters, Limited, capital $100,000; Coast Shale Brick Company, Limited, capital, $100,000; Lillooet Power & Light Co., Ltd., capital, $50,000.

A big railway project was brought before the Railway Committee of the Commons when a bill was considered to incorporate the British Columbia and Dawson Railway Company, which proposes to build a railway from Lytton, B.C., to Dawson City, crossing the Grand Trunk Pacific at Fort George and with a branch to Vancouver. The scheme is backed by big capitalists of New York and Chicago, who have already spent over $80,000 on surveys and who intend to proceed with construction at once. The line would be 1,000 miles in length and although the bill only provided for a capitalization of $1,000,000, it was pointed out that the general Railway Act set forth a need for a capitalization of $10,000 a mile and accordingly the capital was made ten millions.

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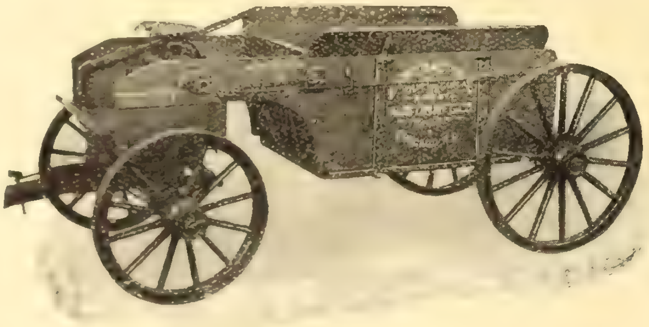

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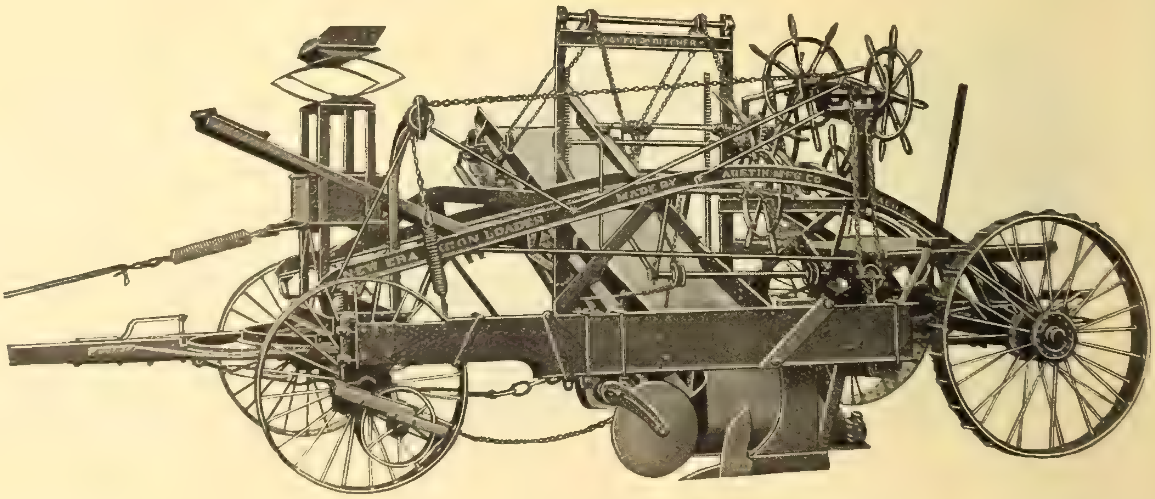

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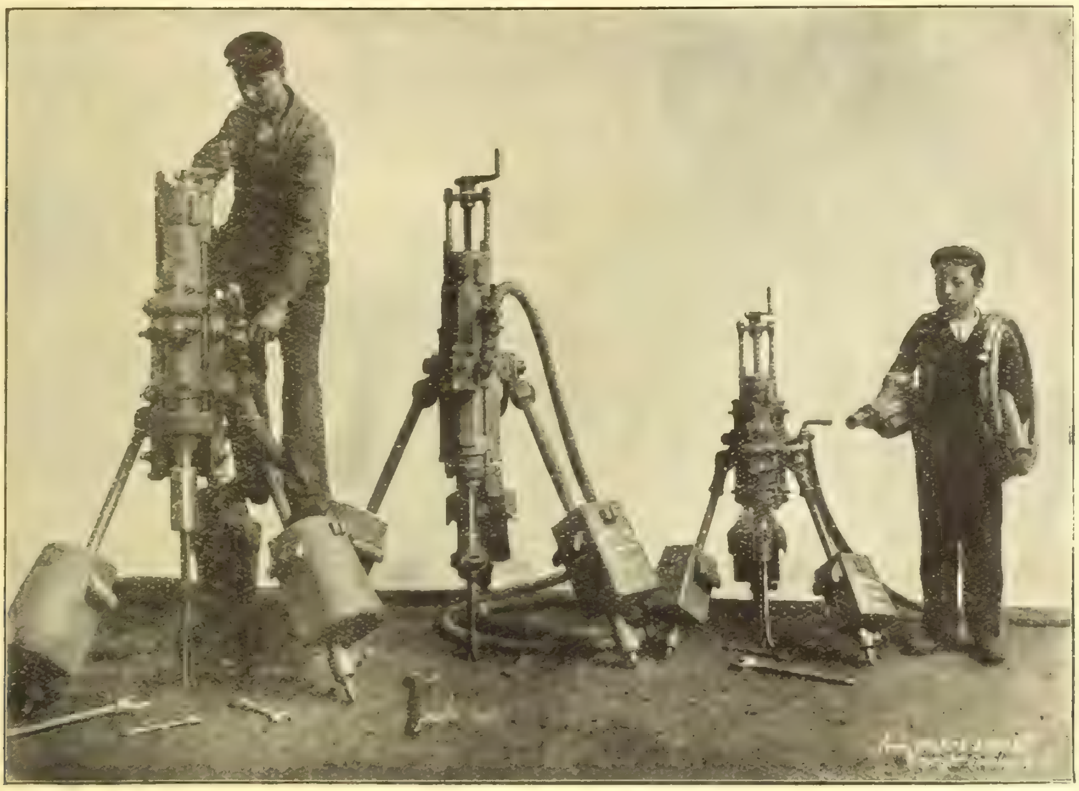

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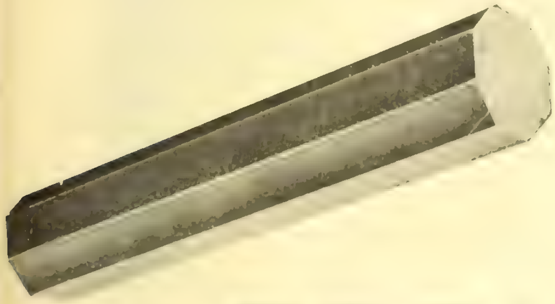

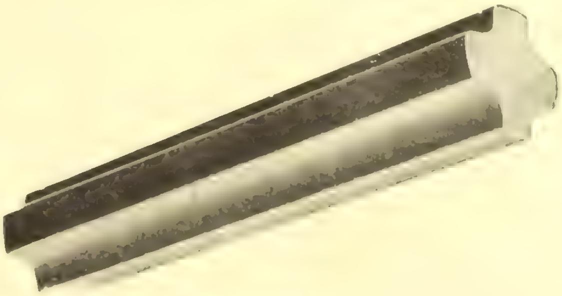

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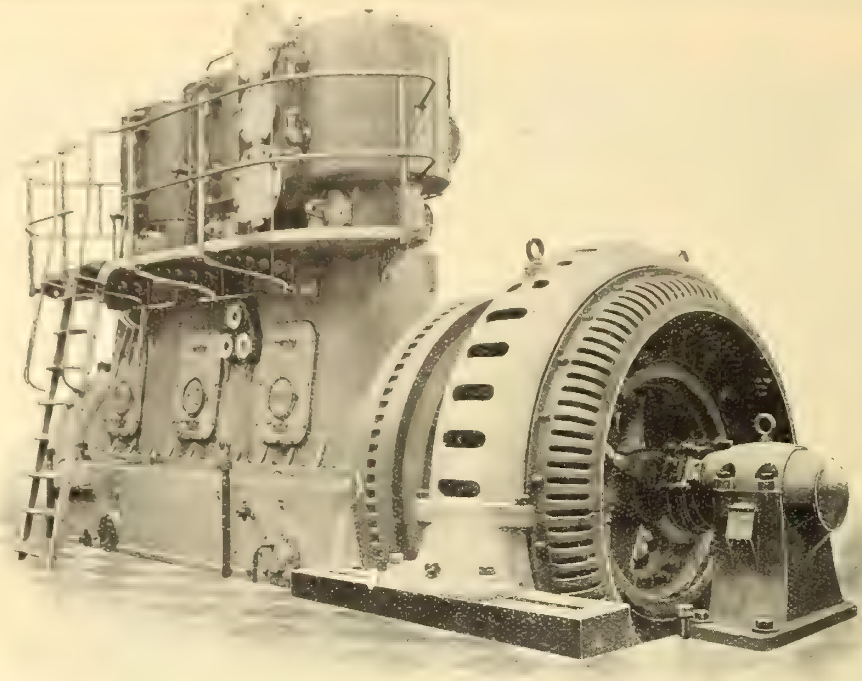

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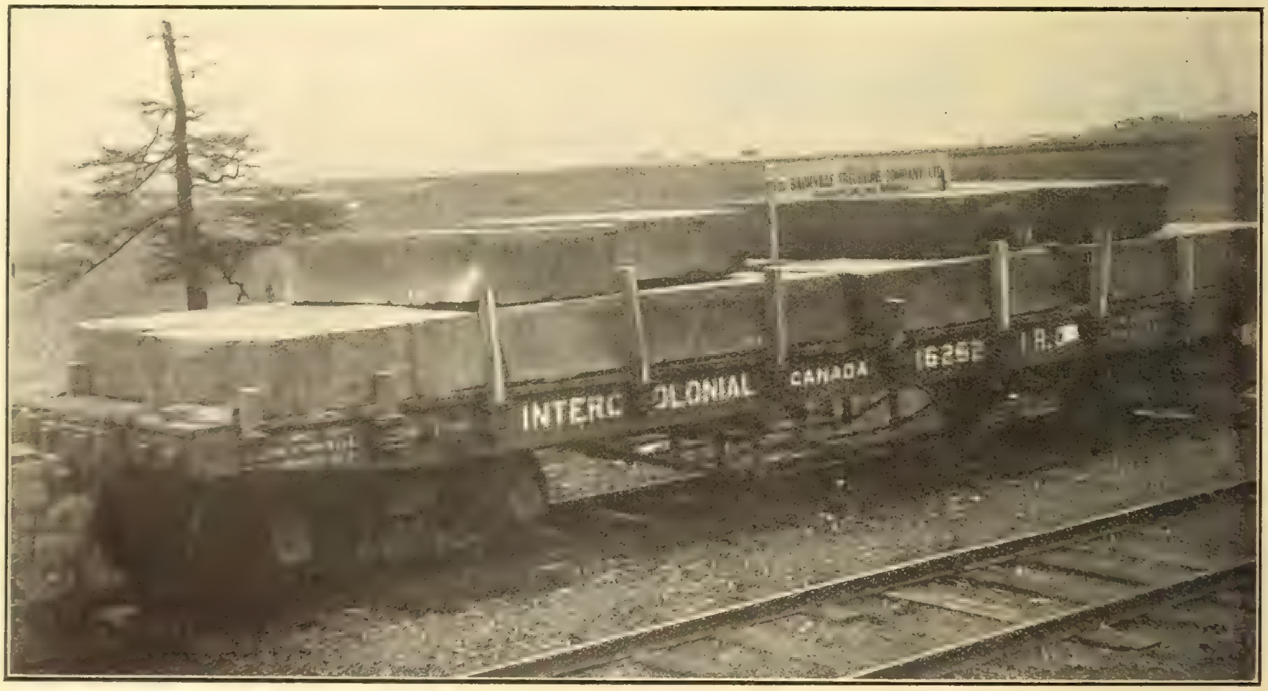

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Our National Heritage

An article is contributed to this number by Mr. W. Cowan, of Toronto, who finds it "difficult to understand the wide divergence of opinion on the tariff question." We can sympathize with him, for we have the same difficulty ourselves. It is indeed hard to understand how any good Britisher with the blood of the old stock in his veins can tolerate the idea of endangering Canada's commercial and national independence for selfish motives. We are speaking disinterestedly. We are protectionists because we are loyal Canadians who look and hope for a greater Britain. Were we concentrated entirely in ourselves and in our own particular business, we would take the other view. Five years of free trade and we would have more American money in our pockets than we would know how to handle. We need the money, too, but we would prefer to be poor to taking any share in selling our birthright.

Some people are inclined to smile at anything that savors of patriotism. Let them smile. They are not of the race that raised Great Britain to its present eminence, nor are they of the stock that laid the foundations of Canada's national life.

We have struggled for independence and we are now in a position to wait until the United States is ready to give us what we want on our own terms. What justification can there be for us to endanger the control of our natural resources and to give an alien people the power to dominate our markets? Heretofore we have been prosperous, and prosperity has come to us in spite of, and not because of American influence. Under existing conditions the periodical waves of depression that sweep over the United States are held back at the border. Under the so-called "reciprocity" arrangement we, also, shall have to weather the financial storms—brought about by disturbances in which we shall play no part—and there are indications of some big ones in the brewing.

It is contended that Canada has held her own with the United States in the past, but the transactions recorded in history do not support the contention, and our experience in the period of stagnation that followed the treaty of 1854, and the attitude of the American Government subsequently, should not be forgotten at this juncture. Throughout the present negotiations there has been an inclination on the part of those at the helm to arrogate to themselves more power than has been entrusted to them, more influence than they really wield. Let us make no mistake. This is a mighty leap Canada is contemplating and it must be the voice of the nation that shall say whether she is to attempt it.

One last word. What plaint can the farmers make under present conditions? And the tariff is urged in their behalf. Eighty per cent. of the products of the Canadian farmer find a market in Canada. Is it not to his advantage to contribute to the development of Canadian cities rather than help to check that development and so impair his best market. As Mr. Cowan intimates, the farmer is getting consideration beyond his merits and altogether out of bearing to the small proportion he bears to the rest of the community, both in regard to population and vested interest.

Canada can hold her own with any nation or people who are willing to play the game and play it fairly. Such has not been our experience with the United States either in business or in play.

Confidence a Valuable Asset

It is the self-confident man who wins. He who strikes out boldly, who does not wait for time or tide, who does not sit on the stone of Fate waiting for an opportunity to come along, who goes through obstacles and not over or around them, who is not waiting for others to speak, think or act, is the man who is going to win in this new country.

There is a great demand for the self-centred man—the man who is not afraid of himself, who, if he cannot say, "I will," at least says "I will try." Leaders, not followers, original thinkers, not imitators; men with new ideas are being called for loudly in all the important walks of life.—Orison Swett Marden.

Paving Work at Victoria, B. C.

Victoria, B.C., according to a local paper, is being besieged by agents of United States companies attracted by the city's important asphalt paving programme for the year. The city engineer, Mr. Angus Smith, expresses openly his intention of establishing local industries and employing British labor. The experience of other cities with outside firms, he says, has not been favorable. Further, Mr. Smith regards it as being in the interests of the city that the council has decided to obtain from the legislature at its present session an amendment to the Local Improvement Act which will enable the corporation to let its paving contracts this year on the same basis as those which have been let up to the present, the successful bidder leaving 15 per cent. of the contract price in the hands of the city for a period of ten years, the contractor during the life of this agreement to keep the pavement in a proper state of repair, the amount thus held back by the city being forfeited to the corporation in the event of the materials and workmanship being faulty.

Plans and specifications have been prepared and tenders are pending or actually being called for a considerable amount of paving work. The council is setting a good example in paring down the preliminaries and getting this construction under way at the earliest possible date, thus enabling the contractors to take every advantage of the early spring weather. Too often exactly the opposite is the case. Weeks, and sometimes months are wasted in trifling disputes over incidental matters, with the result that the work remains uncompleted by late fall.

Reciprocity and what it Means to Canada

Proposed Agreement Inimical to Best Interests of the Country—The Manufacturer's Standpoint and the Imperial Aspect—U.S. Entanglement Undesirable

By W. Cowan, President Luxfer Prism Company, Limited, Toronto

It is difficult to understand the wide divergence of opinion on the tariff question. Truly it appears impossible to get the two extremes together. On the one hand there is the idea of free trade in its broadest application, namely, that of buying the largest amount for the money, and on the other, that of developing our manufacturing and commercial interests and keeping our money within our own borders—even at a slight additional cost on some manufactured goods. A great deal is said upon this subject at the present time, but to my mind there are still a few points worthy of particular attention. I have just read in the Busy Man's Magazine an interesting article by Mr. E. C. Drury, which is thoroughly typical of the free trader's standpoint, but which, unfortunately, is wrong. The principles advocated are not the best for the prosperity of this country.

I have heard it said that we are the most prosperout country in the world; that our people have more wealth per capita in land value than any other country in the world. Then, I say, let us lower our tariff, chase our manufacturers out of the country or leave them open to the uneven competition of those on the other side of the line, who have become immensely wealthy and powerful under a high tariff and can consequently sell many of their manufactured goods in any market in the world. Then we will be more prosperous still, as we will have the same country owned by fewer people.

Free Trade Fallacies.

Now I do not think that this is the intention of the free trade party. I believe they are firmly convinced that our manufacturers are banded together for the purpose of extorting high prices for the goods they make for the farmers, who usually consider themselves the sufferers. The farmer, however, is not affected especially and consequently I do not see why he should have special consideration. As a matter of fact the farmer is benefited much more from present trade conditions than the manufacturer. Clothing, furniture, in fact almost all things required for household use, have decreased in price during the last ten years, but the products of the farm have doubled, and in many cases trebled in the same period. Statistics are unnecessary, the above statement being common experience.

The lower rates on manufactured goods are attributable to the manufacturer's knowing his business, having the courage to put his money into it, and to hard work.

The free trade party has an idea that money invested in the manufacturing business is a gold mine. This is not the case. Many manufacturing businesses are successful and the money invested in them is lost. Sometimes the first unsuccessful effort is taken up by someone possibly more adapted to that particular business, who succeeds in making money. Do you grudge him the result of his ability? Again, the large manufacturing businesses of this country are the outcome of years of development. In many cases there was little encouragement until the population began to increase as a result of our natural resources—of mining as well as agriculture.

Building up the United States.

What is the good, however, of producing wealth and handing it over to our wealthier neighbors? This is what we are doing. Money is pouring into our storekeepers and going over the border at the rate of several hundred million dollars a year, helping to make a wealthy nation wealthier. By a reasonable change in the tariff we could have manufacturers establish works in this country, probably from the United States, that would keep much of this money in the country, apart altogether from the extra employment it would give our people and the resultant activity in other departments of trade.

With these conditions, the farmer would enjoy a better market, as increased population would naturally mean a greater consumption of products. We can never depend on the United States market for our produce. We are far better not to depend on it. They took it from us and now we are supplying our Mother Country, which observed from an imperial standpoint, is better for both Canada and Great Britain. This is an important matter. The Mother Country would be in a bad condition some day if food stuffs were declared contraband of war. We have no difficulty in disposing of all we have to sell and we do not need the proposed tariff agreement.

There are no shrewder dealers anywhere than in the United States, and they make no secret that they wish to effect a better arrangement with us to admit their manufactured goods. In return they will admit our food stuffs on better terms. Now then, every inch we give to them for manufactured goods, which we can manufacture, means that much less business for our manufacturers or for manufacturers whom we should have, and every time we adjust our tariff so that it makes it an object for manufacturers to establish in this country, we save that capital for ourselves, which otherwise goes out of our country.

It is said by free traders that there is a growing desire for a lower tariff in the United States. No doubt there is, and even among some high tariff people, but these people have became so wealthy and powerful that they can compete in the markets of the world. We have many a long day ahead of us before we get to the position of manufacturers in the United States.

Proper Adjustment Needed.

Free trade on its broadest principle will not work for Canada. Therefore, we should try and adjust our tariff on the most equitable lines. There are goods that will not be manufactured in this country for years, and in such cases the tariff might be taken off altogether, e.g., window glass. In other lines an increased tariff would mean a great increase in the producing capacity of this country. I would mention, for instance, iron. At present there are hundreds of cars of iron and steel brought into Canada from the United States every year, and just at the present moment you can buy iron in the United States, pay the duty on it and lay it down here for a little less than you can buy from our own Canadian mills. This is attributable to cut prices following decreased demand in the United States. This is an undesirable condition. An adjustment of the tariff would mean that the United States Steel Company would establish plants on this side of the line.

In 1878 I was brought up to think that the N. P. was a wicked measure put upon the people by Sir John A. Macdonald, but when I grew up to understand the basis of buying, selling and manufacturing goods, I had to change my mind. If we needed a National Trade policy then, we need it more now, because we need to buy more now. We are prosperous, but we do not know what the word means as compared with the United States.

What we need is another Sir John A. Macdonald —I do not speak politically—with his charm of putting things in an attractive manner, and his foresight. This is a business proposition that must be made diplomatically to be successful.

Let us, therefore, join hands to keep our people and our capital on our own side of the line, bearing in mind that the farmers can never make a populous country; because to put another million farmers into Canada would make a big hole in the farming lands, whilst this country is capable of taking care of many times that number of good mechanics if we set our sails right to hold them.

The Design of Retaining Walls

The lack of agreement between the usual theories concerning the pressure of earth on retaining walls and the actual pressures observed in experiments made with small rotating retaining boards recently led Professor William Cain to make a critical study of the subject. This author's monograph on retaining walls in Van Nostrand's Science Series contains an explanation of the so-called sliding-wedge theory of pressure on a retaining wall which differs from Rankine's theory in taking into consideration the angle of friction of the earth on the wall as well as the angle of repose of the earth itself. The results of the recent investigation by Professor Cain, given in an elaborate paper in the January "Proceedings" of the American Society of Civil Engineers, indicate that the lack of harmony between theory and experiment is due to neglecting the influence of cohesion in practical formula. This is expressed by the author as follows:

1. When wall friction and cohesion are included, the sliding-wedge theory is a reliable one, when the filling is a loosely aggregated granular material, for any height of wall.

2. For experimental walls, from 6 to 10 ft. high, and greater, backed by sand or any granular material possessing little cohesion, the influence of cohesion can be neglected in the analysis. Hence, further experiments should be made only on walls at least 6 feet, and preferably 10 feet high.

3. The many experiments that have been made on retaining boards less than 1 foot high have been analyzed by their authors on the supposition that cohesion could be neglected. This hypothesis is so far from the truth that the deductions are very misleading.

4. As it is difficult to ascertain accurately the coefficient of cohesion, and as it varies with the amount of moisture in the material, small models should be discarded altogether in future experiments, and attention should be confined to large ones. Such walls should be made as light, and with as wide a base, as possible. A triangular frame of wood on an unyielding foundation seems to meet the condition for precise measurements.

5. The sliding-wedge theory, omitting cohesion but including wall friction, is a good practical one for the design of retaining walls backed by fresh earth, when a proper factor of safety is used.

O. A. C. Renews its Offer of Assistance in Drainage

The Ontario Agricultural College is endeavoring to help those in doubt about drainage. Any farmer in Ontario wishing assistance in his drainage problems may have the same by making application to the Department of Physics, O. A. C., Guelph. As soon as possible after receipt of the application a drainage adviser is sent to make a survey of the land, after which he makes a complete map showing the location of the drains, the grade, size of tile, etc. When completed the map is sent to the owner, so that he has an accurate guide to follow in putting in his drains. As in previous years, the only outlay to the farmer is the necessary travelling expenses of one man in connection with the survey. The railways give a rate of a cent a mile for this work, so that the travelling expenses are light.

After one survey in each locality a drainage demonstration is held right in the field surveyed, to which all the neighbors are invited. At this meeting simple methods are demonstrated of making a drainage survey, finding the fall of a ditch, determining the grade, digging to grade, etc.

Those wishing to make application for a survey should write the Department of Physics, O. A. C., Guelph, whereupon regular application forms will be sent.

Paving bricks of destructor clinkers have been in service four years on roads in the Royal Borough of Kensington, England, and an inspection of these highways by a committe of the Sanitary Institute resulted in the award of a bronze medal to Messrs. Goddard, Massey & Warner, Limited, sanitary engineers, of Nottingham, who control the manufacture of the machinery for turning out the blocks. The clinker is ground in a special mill, graded in size by screens, mixed with hot Trinidad asphalt and oil, and pressed into bricks measuring 9 x 4½ x 3 in. After pressing the bricks are automatically placed on a steel belt conveyor in which they are cooled with water. The asphalt is heated by steam supplied by a boiler at about 100 lb. per square in. pressure; the temperature of the steam when it reaches the softening tank is said to be over 300 degrees Fahr. The bricks are said to wear exceedingly well and are not slippery under adverse atmospheric conditions. Another advantage claimed for them is that they are practically noiseless under traffic. The works of the Royal Borough of Kensington, where the bricks are manufactured, has a capacity of [illegible] paving blocks per hour. The machinery for making the blocks is the invention of Mr. William Warner.

Toronto's Preparations for Cement Show

Many Attractions Scheduled for Annual Meeting of Canadian Cement and Concrete Association—A Noteworthy Event, March 6-11

The annual convention and exhibition of the Canadian Cement and Concrete Association, which is to be held at Toronto in the St. Lawrence Arena from March 6th to 11th, is exciting much attention among the cement interests. Mr. Wm. Snaith, secretary of the association, has been hard at work for months perfecting details for the meeting, and judging by available information he is deserving of much congratulation.

Professor Gillespie, Toronto, President Canadian Cement and Concrete Association.

The most enterprising arrangements have been made for the accommodation of visitors and their friends, and in this respect the Canadian Association is profiting largely by the experience of the big American organizations. For instance, they have rejected the proposal to have a military band and have decided instead to set aside a central location for a first-class orchestra, with comfortable accommodation for visitors. At the New York show the programmes rendered by Sousa's Band were heard by practically none of those in attendance.

The greatest interest is being taken in the exhibition, and already most of the space has been allotted. A noteworthy feature at this stage is the energetic manner in which American manufacturers have made application for space. With the tremendous development of the industry there will be many novel exhibits and many things of additional interest. Twelve months in the cement industry means a great deal.

Among the most interesting exhibits will be that of the Canada Cement Company, which will take the form of a complete cement plant in operation. The entire process of the manufacture of Portland cement will be shown in detail. The exhibit will not be on a miniature scale, as is evidenced by the fact that the rotary kiln, which in ordinary mills is 60 or 100 feet in length, will be 8 feet long. This proportion is maintained throughout the installation and the whole mill will be quite capable of producing cement of the highest quality.

Another feature of interest at the show will be the cement gun, exhibited by Steel & Radiation, Limited. This is one of the latest inventions and the exhibit itself will be one of two or three complete machines at present in existence. This machine is expected to effect a revolution in some branches of cement work. One of its spectacular possibilities is its capacity to transform a dilapidated wooden structure into fireproof concrete. We hope to publish a detailed description of the cement gun in a later issue.

The Canadian Inspection Company have arranged to show a complete cement testing laboratory. The exhibit will be replete with every modern improvement known in this important department and will in addition contain a number of unique and valuable features. This laboratory will doubtless receive special attention.

Many important papers are scheduled for presentation at the convention. Among the speakers may be mentioned the following:

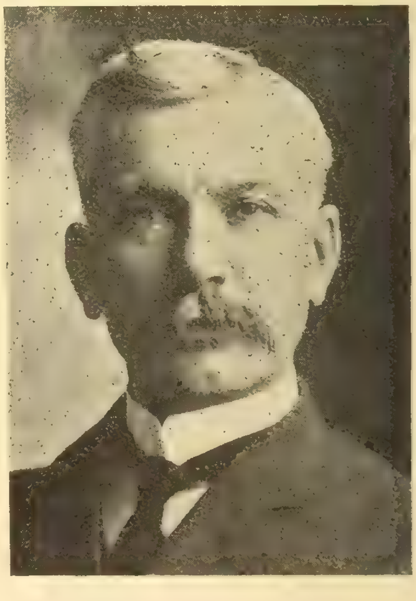
W. A. McLean, Provincial Engineer of Highways—"Cement Concrete in Highway Construction."

Robert Cathcart, Glidden Varnish Company, Cleveland, Ohio—"Cement Surfaces and Finishes."

Richard L. Humphrey, President National Association of Cement Users, and Director United States Structural Materials Testing Laboratories, Pittsburg, Pa.—Subject undecided.

R. F. Havlik, Ideal Concrete Machinery Company, South Bend, Ind.—"Concrete Blocks."

Joseph M. Carrere, Blanc Stainless Cement Company, Allentown, Pa.—"The White and the Gray."



Hon. G. P. Graham, Minister of Railways and Canals, Hon. President Canadian Cement and Concrete Association.

C. W. Noble, Consulting Engineer, Toronto, Ont.—"Prevention of Corrosion in Metal Lath."

F. Barber, Barber & Young, Bridge and Structural Engineers, Toronto—"Adaptation of Concrete for Long Span Bridges."

W. M. Kinney, Asst. Inspecting Engineer, Universal Portland Cement Company, Pittsburgh, Pa.—"Manufacture of Portland Cement."

E. A. James, Editor Canadian Engineer, Toronto—"The Necessity for Inspection in Concrete Work."

The names of several others who have consented to read papers are not included as the subjects have not yet been chosen.

An event such as has been planned by the Canadian Cement and Concrete Association should have a most stimulating effect upon the various branches of the industry and should receive their hearty support. Upon the many advantages to be derived from an intelligent interest in the educational work, both at the convention and at the show, it is perhaps unnecessary to expatiate. The industry is at such a comparatively preliminary stage and there is still so much to be learned concerning the uses of cement in constructional work, that no one in any way identified with this material can afford to neglect the opportunity of acquiring additional knowledge.

The president of the association, Professor Gillespie, has been carrying on for many years valuable investigations and tests of the properties of various structural materials. His work in the cement field has gained for him a reputation as an international authority.

The remainder of the directorate is composed of the following: Vice-president, Mr. Wm. Fry Scott, Toronto; T. L. Dates, Owen Sound; Kennedy Stinson, Montreal; D. C. Raymond, Toronto; Ivan S. MacDonald, Toronto; James Pearson, Toronto; A. E. Uren, Toronto; W. H. Ford, Montreal; C. F. Pulfer, London; Gustave Kahn, Walkerville; R. E. W. Hagarty, Toronto; C. R. Young, Toronto; J. R. S. Scott, Toronto.

C.P.R. to Tunnel Under City of Vancouver

The congestion of business along the waterfront, and the holding up of traffic on leading streets by shunting operations, has for long been engaging the serious attention of both the C. P. R. authorities and the council of Vancouver. It is now definitely settled that the trouble will be obviated inside of a couple of years by the construction of a tunnel under the business portion of the city, the plans being now before the management in Montreal. The southern entrance of the tunnel will be at a point near the drill hall on Beatty street, beyond which the railway company has a large section of property. The natural configuration of the ground there will make tunnelling an easy matter, for the railway tracks are already many feet below the level of Beatty street. From that point the tunnel would swing in a semi-circle around toward the northwest and strike Hastings street—many feet under that thoroughfare, of course—at the intersection of Seymour. The tunnel would then run along under Hastings to a point about opposite the end of Burrard street, where the tracks are already forty or fifty feet below the level of the street.

The construction of this tunnel, which would be a little less than a mile in length, would put an end to the use of the tracks which now cross Vancouver at street level, making difficult and hazardous traffic over such down-town streets as Hastings and Powell, which carry double-track car lines. It is suggested that the tunnel scheme is a portion of a big programme of improvements which the Canadian Pacific has in mind in Vancouver and vicinity—including the enlargement of the depot and other terminal facilities.

Iron Moulds for Concrete Balusters

The concrete balusters for the railing of the Jerome avenue arch bridge, in the Borough of the Branx, New York City, were at the beginning of the work cast in plaster moulds. These, however, gave satisfactory results only for three balusters and then cracked or lost their sharp lines. Iron moulds were then tried and have given satisfaction. One man with the aid of a laborer part of the day has been able to clean the forms, mix and pour six moulds and finish the six balusters cast the previous day. The balusters are scrubbed to expose the aggregate, and to make the handling easier while scrubbing and prevent breakage are mounted vertically in a frame. A reinforcing rod projecting from top and bottom runs through the center of each baluster, and the bottom of this rod drops into a socket on the work bench, while a ring holds the top. The baluster can thus be rotated as the scrubbing proceeds.

A portable motor-driven pumping outfit was used to handle the water encountered in the cofferdams when building the reinforced concrete arch bridge of the Charles City Western Railway over the Cedar River. The outfit consisted of a 6-in. centrifugal pump bolted between the feet of the two 6 x 6-in. uprights, 24 ft. long, and a horizontal-shaft motor on a platform at the top of these uprights. Automobile gears transmitted power from the motor to a vertical shaft belted to the runner shaft of the pump. The outfit as arranged could be picked up by the cableway and moved to any point in the travel of the latter. The operation of the motor was controlled from a starting box on the shore.

An important extension to the sewer system of Victoria, B.C., is now under consideration. The project involves an expenditure of $250,000. Preliminary surveys and plans are practically completed.

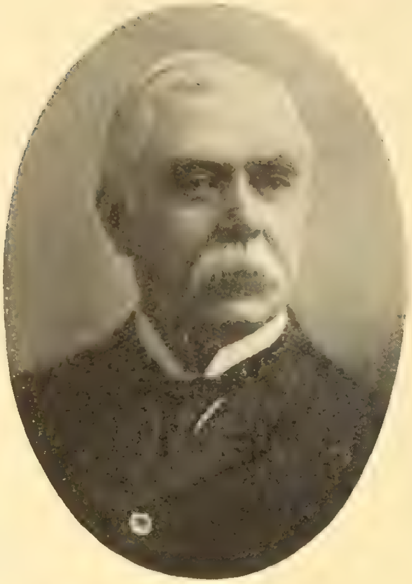
Messrs. Evans, Coleman & Evans, Vancouver, B.C., have purchased the interests of Raymond & Sons, in Victoria, where they will carry a complete line of builders' supplies.

The building permits isued at Toronto last month totalled $548,580, compared with $682,088 for January, 1910.

At a recent meeting of the Allied Trades and Labor Council of Ottawa, a committee was appointed to approach the Builders' Exchange with a view to co-operating with that body to urge the council to pass a by-law to tax outside contractors. The reason for this step is given as a desire to prevent the importation of cheap labor.

The construction programme of the city of Edmonton for the coming season provides for an expenditure of nearly $900,000. The largest individual item in the estimates is $281,000 for sewer construction. Of this amount, some $200,000 will be required for the Rat Creek trunk sewer.

Mr. Willis Chipman, 1st Vice-President



Captain Gamble, President

Professor Haultain, 2nd Vice-President

Engineers' Club of Toronto Re-Organized

Annual Meeting Discloses Close Co-operation of Allied Professions—Excellent Facilities Provided at New Club Rooms—Strong Directorate Elected

Mr. C. H. Heys, 3rd Vice-President

Mr. R. B. Wolsey, Secretary-Treasurer

The success which has attended the reorganization of the Engineers' Club of Toronto must be a source of much gratification to the profession in general and in particular to those who for several months past have been devoting their time and thought to a satisfactory consolidation such as has now been effected. Heretofore the principal function of the club was a purely professional one and membership in the institution was limited to engineers, but the scope of the club has now been widened to admit allied interests, and the success of the broader policy is already apparent. The need for social intercourse was recognized and the facilities that have now been provided at the headquarters of the club, 90-96 King street west, are a revelation of the possibilities in this direction. The premises have been considerably enlarged and a spacious dining room has been provided on the floor below, which has also been taken in. The mid-day luncheons are particularly well attended, while the cosy billiard room is becoming quite popular.

No effort has been spared in making the library and reading room of real service to the members and the means provided for access to all the leading technical publications will be a great advantage.

The technical side of the club will be developed, and special attention will be paid to the presentation of papers and the discussion of engineering problems.

The annual meeting on February 6th may be regarded as indicative of the club's future. An attendance of nearly one hundred, in the face of the heaviest snow-storm of the season and consequent interference to street car service, must be very encouraging to those who have labored so zealously for the establishment of the club.

The meeting approved of the by-laws, with minor amendments, elected directors and auditors, and disposed of routine business. The entrance fee is $50 and the annual fee $30, the latter commutable at $25 if paid before February 1st of each year.

President Canniff was able to present a report which was unanimously accepted as satisfactory, the financial position being quite as good as could be expected.

The number of members is already in the neighborhood of 400, while the limit, according to the by-laws, is 800. Doubtless in the near future it will be necessary to establish a waiting list.

The officers, directors and committees for 1911 are given below. The club is to be congratulated upon the representative nature of its list of officers.

The Directorate.

Officers—Capt. Killaly Gamble, president; Willis Chipman, first vice-president; H. E. T. Haultain, second vice-president; C. H. Heys, third vice-president; R. B. Wolsey, secretary-treasurer.

Directors—J. J. Ashworth, R. A. Baldwin, C. H. Acton Bond, W. A. Bucke, Edmund Burke, C. M. Canniff, W. E. Douglas, E. A. James, J. L. Street, J. B. Tyrrell, T. S. Young. las, E. A. James, J. L. Street, J. B. Tyrrell, T. S. Young.

Finance Committee—J. J. Ashworth, chairman; W. A. Bucke, C. H. Heys.

House Committee—C. H. Heys, chairman; C. H. A. Bond, W. A. Bucke, C. M. Canniff, Willis Chipman, W. E. Douglas, H. E. T. Haultain.

Library and Papers Committee—H. E. T. Haultain, chairman; R. A. Baldwin, Edmund Burke, E. A. James, L. J. Street.

Admission Committee—Willis Chipman, chairman; R. A. Baldwin, C. H. A. Bond, Edmund Burke, J. B. Tyrrell, T. S. Young.

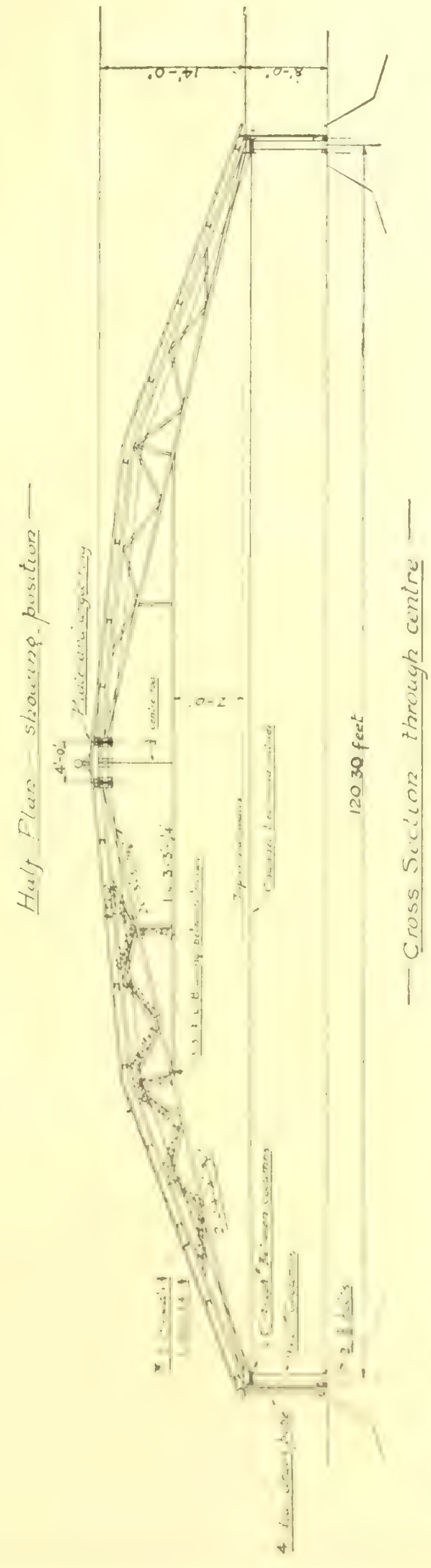
New Sewage Disposal Plant at Regina

The sewage disposal plant under construction at Regina has several features which are somewhat out of the ordinary and which depart considerably from the usual architectural lines.

In climates where the filtration beds and tanks are apt to freeze it is necessary to have them housed. With a plant of that type at Regina, the covering of the filtration beds presents problems in construction of a somewhat different and complicated nature.

The sedimentation tank effluent is treated by Adams patent revolving sprinklers. The raw sewage from the sewers flows first into an inlet well, where any heavy material which may have gotten into the sewers is deposited. The lighter solids flow through a valve into the liquifying tanks. Here they are broken up into their constituent parts and emerge from the tank in the form of a liquid. This liquid, atlhough a great improvement on the original sewage, has to be further treated in the filtration beds. The level of the filtration beds being lower than the tanks, the effluent is led under a few feet of head through a 4-inch pipe to the centre of the filtration beds. These beds are circular in form and have an outside diameter of 120 feet. The head on the liquid raises it through the Adams patent sewage distributor to the top of the filter bed. It then flows through four revolving sprinkler arms. These arms are constructed of pipe and are perforated on one side. The effluent naturally flows through the holes and the reaction of the liquid starts the arms revolving and as a result ensures an equal distribution over the top of the filter bed. These sprinkler arms are supported by guy lines from the centre of the Adams sewage distributor.

From the above short general description of the process it will be seen wherein lie the difficulties to be overcome in connection with the covering of the tank. The large diameter of the tank and the fact that it is impossible to have any supports inside the tank as



Half plan of roof, and plan of truss of sewage disposal plant at Regina, erected by the Manitoba Bridge and Iron Works, Ltd.

they would interfere with the action of thee sprinklers is apparent. These difficulties were overcome as shown in the illustration. Sixteen steel trusses of 59 feet span, radiate from a centre steel ring of 4 ft. 6 in. diameter and 14 in. deep. The outer ends of the trusses are carried on posts. The circular ring is constructed of 12 x ⅜ in. plate and with 4 x 4 in. angle top and bottom and with diaphragms of 12 x ⅜ in. plate and 2½ x 2½ in. angles through its centre.

Owing to the conditions described it was necessary to build the trusses as shallow as possible. The top chord is made up of two 6 x 5 x ⅜ in. angles and a 14 x ⅜ in. plate for the bottom half of truss and 5 x 3½ in. with 14 in. plate for the top half. The bottom chords are 4 x 4 x ⅜ angles for their lower section and 3 x 3 x 5-16 for the upper section.

From the centre of the lower chords there run horizontal tie angles, which are connected by an octagonal plate exactly in the centre of the filter. The purlins are of steel channels and angles and the bracing is of angles. The columns on the outside are of I beams, with bracing of channels and angles between them, all as shown in the illustration. All the steel was designed for the usual wind and snow loads. The roof covering is to be of 1-in. shiplap and galvanized corrugated iron. The sedimentation tanks are also being covered with a steel frame 205 x 108 feet, but this presents no features out of the usual. The whole of the steel work has ben designed and fabricated by the Manitoba Bridge and Iron Works for the city of Regina through their chief engineer, Mr. John Marshall.

The Durability of Concrete Construction

Effect of Lime Content of Cement—Necessity for Care in Selection and Proportioning of Aggregate—An Instructive Discussion

By H. S. Spackman

The purpose of this paper is to bring to your attention the discussion on the effect of the high lime content of cement on the durability of concrete construction under special conditions, which has occupied more or less the attention of technical societies and the columns of the technical press, especially in Europe, during the past few years.

This paper is not to be interpreted as questioning the advisability of the use of concrete, or distorted into a prophecy of the failure in the near future of the numerous concrete constructions in existence, for concrete, when properly prepared, is one of the best and most durable of structural materials.

It is desired, however, to emphasize the fact that its durability is not due to the Portland cement content, but to the care in the selection of the aggregate, the proportioning of same, and the workmanship in mixing and placing the concrete. The making of concrete is a manufacturing process, in which the cement is only one of the several raw materials required, and forms but a small proportion of the finished produce. Such being the case, the durability and strength of the finished material depend on the user, and not on the cement manufacturer; and this will continue to be the case until there has been developed a hydraulic cementing material which will alone be capable of resisting the destructive action of water containing sulphates, or other injurious chemicals.

This discussion may be epitomized in the following statements:

1. All Portland cement is, by reason of its high lime content, subject to destructive attack, under conditions favorable to such action, not only from sea-water, but also from acidulous and other saline waters.
2. The resistance of concrete to the disintegrating effect of such waters depends largely upon the impermeability of the mass.
3. That it is essential to the durability of concrete construction under unfavorable conditions that there be developed a hydraulic cement having strength under mechanical test approaching that of Portland and free from the properties which render it liable to destruction by chemical action under such conditions.

Owing to the large use in Europe of cement in maritime construction, where the evil effects of the high lime content is accentuated by exposure to sea-water, more thought has been given in Europe to this particular phase of the question than here, or than to the study of the destructive effect of ground waters, which is equally noticeable, and even more important. Enough work, however, has been done along these lines to show the danger of the use of high lime cements when the construction is to be subjected to waters containing sulphate of lime, which Bied, in his interesting paper "Experiments on the Decomposition of Mortars by Sulphate Waters," read at the Fifth Congress of the International Association for Testing Materials at Copenhagen in 1909, shows to be even more destructive in their effect than sea-water.

The importance to all constructors of the fact that waters containing solutions of sulphate of lime exert a destructive influence on Portland cement concrete, becomes manifest when it is realized that the ground waters of our large cities generally contain considerable amounts of sulphuric acid, which, or contact with the cement, may dissolve the lime and form destructive solutions of sulphate of lime.

Bied says in the article referred to:

> The decomposition of mortars, which are exposed to the action of the sea or waters charged with sulphates, has for a long time already occupied the attention of engineers, and experiments have been multiplied in all quarters with the object of discovering some hydraulic binding material which would be free from liability to destruction.
>
> Up to recent years attention has chiefly been concentrated on the injurious action of sea-water, and although the destructive effect of sulphate of lime was not unknown, it was not as a rule taken into consideration.
>
> Having had to inquire into decomposition of mortars by sulphate of lime, observed in 1900, on the line leading from Linarez to Algeria in Spain, and in 1902 on the line St. Girons-Foix, and at the same time in Algeria, we have been induced to submit this problem to a prolonged experimental investigation.
>
> In our researches we have compared materials poor in alumina and aluminiferous mortars, highly calcareous mortars and some of high index.
>
> The action of the diverse saline solutions which were employed is not altogether the same. It may in general be

assumed that the artificial sea-water is 10 or 15 times less active than a 12 per mille solution of magnesium sulphate. Yet certain artificial cements have been decomposed more rapidly in sea-water than in the solution of anhydrous magnesium sulphate solution of 12 per mille.

Water saturated with sulphate of lime appears to be the most active decomposing agent. Constructors must constantly be on the alert in this respect; in fact, waters saturated with calcium sulphate are sometimes met with far from any recognized occurence of gypsum.

On the other hand, waters which at certain moments do not contain more than 0.1 or 0.2 gram of calcium sulphate may become saturated during periods of drought.

In our laboratory and under the experimental conditions above indicated we have not met with any slow or quick-setting cement, whatever its mode of manufacture and its chemical composition, which has resisted the action of this solution for six years.

Similar destructive effects of the ground water have been noted in the West where the water is charged with a solution of alkaline salts.

Minimum of Lime Increases Durability.

Whether or not the same rule, the lower the lime content, the more durable the cement, will hold good for cements above ground, exposed only to the influences of the atmosphere and the moisture and gases contained therein, I am unable to say, as I cannot recall any careful and systematic investigation and study of the comparative durability and strength over long time periods, where low lime and high cement concretes were tested under like conditions, that is in air, in a dry state under the conditions similar to those occurring in the interior of reinforced concrete construction, and also exposed to alternate wetting drying, as would be the case of the concrete on the exterior of reinforced concrete construction. Such an investibation extending over a period of several years where a number of full-sized beams were tested at yearly intervals, the test pieces being made from the same aggregate with various cements, would be of great value.

It is known, however, that the briquettes of Portland cement stored in air show greater variation and more often retrogression of strength and disintegration than companion comparison sets or briquettes stored in water. It is also known that Portland cement clinker will depreciate with time when exposed to ordinary atmospheric influences, and even in sealed air-tight bottles, and that the higher the percentage of lime in the clinker the more marked is this disintegration. It is also known that only a portion of Portland cement ever hydrates or takes part in the hardening. It is, therefore, not unreasonable to suppose that this unacted upon clinker in the cement will disintegrate with time. Whether the disintegration of briquettes stored in air, or the loss in strength, be due in part to the decrepitation of the coarser particles of cement as above indicated or not, is at present a matter of speculation, but it would seem, in view of the well known action of clinker that it would be desirable to have as little inert material in the cement as possible.

Must Make Impermeable Concrete.

That Portland cement is not of itself sufficient under ordinary conditions to insure impermeability in concrete is evidenced by the rapidly growing use of waterproofing compounds, either mixed with the cement or applied as a surface coating, and it would seem that there should be an endeavor, either by improvement in the quality of the cement used or in the workmanship and proportioning of the concrete, to make an impervious material, as it is unquestioned by all investigators that the resistance of concrete construction to the attack of acidulous or saline waters, or other destructive influences, is entirely a function of its permeability.

Are constructors justified in the face of these facts in confining themselves almost entirely to the use of Portland cement to the exclusion of the lower lime hydraulic cements, as is evident from the report of the Geological Survey covering the cement industry for 1909, which shows that there were produced and used in the United States in 1909, 62,508,461 barrels of Portland cement against the production of 1,687,925 barrels of hydraulic cements of all other classes?

The impression must not be gained from this paper that Portland cement is, therefore, unsuited for use under such conditions. As evidence that concrete can be successfully used under adverse conditions, we have properly built structures that have been subjected to such conditions for many years.

It is, however, desired to emphasize that great care must be taken in the use of Portland cement. It is evident that the ability of Portland cement to resist such action can be very much improved, and it was for the purpose of directing attention to this fact, and suggesting that the subject be further investigated to determine whether perhaps some of the other classes of cement might not be more suitable for such use that this paper is written.

Not so many years ago all advertising was considered more or less fishy; anyway, the man who advertised lacked commercial dignity. Later, the concern which advertised now and then was doing all that it thought necessary, and all that was expected of it. Now the non-advertiser is in a hopeless minority, and he who has advertised and stops is considered as having "gone out of business." Truly a wonderful change, and a situation which the advertiser who thinks of stopping for a time "to save the expense" would do well to study carefully.—Advertising & Selling.

A Riding Hall floor, recently laid in the arena of the new club house of the Riding Club of Washington, at Washington, D.C., has a construction the details of which may be of value to anyone about to construct such a floor. The arena is on the main floor of the building, and is carried over the basement on a concrete slab. Upon this slab was first laid a thin coating of asphalt, then a layer of small boulders close together and embedded in hot asphalt and then another coat of asphalt to cover completely the boulder layer. Upon this solid base was placed a 6-in. layer of packed clay and finally an 8-in. layer of tanbark, which latter makes the finish coat.

Mr. Frank P. Jones, general manager of the Canadian Cement Company, Limited, is not worried about the proposed cut of 5 cents a barrel on the duty of cement. He states that there is already some pressure in the east owing to the English preference but he does not regard the contemplated change as anything of material significance to the industry.

Messrs. Preston, Coombe & Cliff, Croydon, Eng., cabled last week that they were willing to undertake the extension of the intake pipe, 2,000 feet, for the city of Toronto. They state that they are ready to commence immediately and to complete in a few months.

Factors Governing Engineers' Contracts

Conditions Which Regulate the Furnishing of Labor and Materials—Three Principal Methods in Use — Economic Considerations*

By Harold Parker

It must be clear to an engineer in charge of construction work of any sort that the various conditions under which the work is to be done shall control his action in making his proposals to contractors, and depending upon such conditions, either one of the three methods would from necessity have to be adopted.

If it is desired that the work shall be completed at a cost not to exceed a fixed sum, and that the estimate previously made by the engineer is to be corroborated, the method defined under "A" would be preferable. This would occur in many instances where public work is involved and the cost of the execution of the work is limited to estimates previously prepared.

In cases such as this there does not appear to be any question as to the wisdom of having the contractor furnish both the labor and materials.

In the practice of all constructing engineers the second method, that is, labor furnished by the contratcor and materials by the party of the first part, must frequently be found to be the best, if not the only method in which the work can be done economically and satisfactorily. This method has the advantage that the engineer, desiring to secure in the work certain types of brands of materials, the cost of which he knows, can be perfectly sure before the work is begun just what the final cost will be, and he can also know what particular kind of material will be embodied in the work, as well as the exact cost of that material.

In this case all contractors who bid on the work are placed upon complete equality, and therefore an intelligent and comprehensive offer can be made by all and an intelligent comparison can also be made.

In the construction of concrete bridges, culverts or walls, this may be by all means the best way to do the work, because it very often occurs that the engineer desires certain kinds of rods, placed as he plans them, or certain particular brands of cement or other material, which he particularly wishes to have embodied in the work, and which would prevent the question arising during the work, or at its conclusion, of the use of other brands of material which might justly be claimed to be of equal quality—thus creating a debative question between the parties to the contract.

At any rate, in cases where it is particularly desired to have a fixed type or character of material, and where there may be doubt in the minds of experts generally as to which is the best, so as to produce uncertainty in the interpretation of the specifications, there can be no question if the materials are furnished by the party to the first part, and the labor alone furnished by the contractor.

This is so true that the Highway Commission of Massachusetts has for many years followed this practice in the construction of its concrete structures, and the reasons for this appear to be good. The Commission at the beginning of each year receives bids for cement to meet certain specifications, which is tested at different times, in order to see that it comes up to the requirements. The cement is furnished the contractors as it is needed, and the responsibility for the excellency of the cement by them is not a part of the contract. In this way uniformity of material and satisfaction are ensured.

The rods are also furnished the contractor of dimensions determined upon by the engineer, and are placed as the engineer directs. The contractor in this case furnishes only the labor and the gravel or broken stone in the concrete.

Under the third proposition, where both labor and materials are supplied by the party of the first part, the instances where contracts are let can be but few, if indeed it may be said a contract can be entered into where neither material or labor are furnished.

The third method, which must from the nature of things involve no agreement between parties, would be preferable in the performance of work the nature of which is such that it is impossible or impracticable to define in specifications, with sufficient clearness or precision, in order to make an accurate estimate of the cost of the work.

It is also preferable in the performance of work of such nature that special skill and knowledge is necessary that has not been acquired by contractors, or, at any rate, by a sufficient number of contractors to secure fair, competitive bids.

It appears to me from the experience that I have had in Massachusetts and elsewhere, that work under contract should be done under either "A" or "B" of the conditions given. If the "C" or final condition is contemplated at all, it should be when the conditions are such that reasonable bids cannot be obtained, on account of the inexperience of contractors, or for other reasons. Therefore, this head, it seems to me, only contemplates a comparison between contract and day labor.

In order to get economical work by day labor it is necessary that the party of the first part shall have a constant force of laborers and foremen trained to the particular kind of work he has in mind, and constantly employed upon the same type or class of work.

It may be, and, in fact, is found that in the maintenance of certain roads, where the conditions under which a contract could be made are uncertain and involve costs which the contractor's inexperience does not permit him to make a reasonable bid, on account of his uncertainty as to the cost of the work, the "C" method is preferable.

We have found in maintaining our roads in Massachusetts, and especially where oil and tar is used, that we can more economically do the work under this final caption than in either of the other ways, and our work is better done, for the reason that we have organized maintenance gangs, under trained foremen, who have learned all they know under the direction of the engineers of the Commission, and who, from their practice under very careful supervision, have become expert. Consequently, our work is better done and at a less cost than it could be by letting it to any contractor. Therefore, it seems to me that where the conditions warrant, either one of the three propositions can well be adopted by the party of the first part, and it must be for the party of the first part to determine, after most careful consideration, which of the three is best suited to the work he has in view.

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*Address delivered before American Society of Civil Engineers at New York, in introducing a general discussion.

In general, I maintain that, wherever possible, the method under "A", the contractor furnishing all labor and material, is preferable for all construction work, except where reinforced concrete constitutes a large proportion of the work.

The method "B," where the contractor furnishes the labor and the party of the first part the material, or a certain proportion of it, is preferable in construction work where the largest portion is reinforced concrete, or is of an experimental nature, or where a bituminous material of a specified kind is used.

The "C" method, where the party of the first part furnishes both the labor and material, is preferable in cases where the amount and kind of work is difficult to determine, and where the work is of such a nature that the contractors cannot make intelligent estimates of the cost.

Permeability of Concrete and Solubility of Aggregates

Tests on the permeability of concrete and the solubility of aggregates were made during 1909 by the Board of Water Supply of the City of New York, which has published in its latest annual report a summary of the work accomplished. Studies were made of the effects of various fine materials incorporated in the matrix of concrete, in reducing permeability, including clays, hydrated lime, and puzzolan and sand cements, these two cements being more finely ground than Portland cement. The conclusion was reached that concrete, practically impervious under 200-ft. head, can be produced with any of these materials, but that equally good results can be secured by using sufficient Portland cement, the latter method having the advantage of securing concrete of increased strength, while the other materials usually reduce strength.

A series of tests was made on the solubility of various rocks used as concrete aggregates on the work, particularly limestone and others of the more soluble rocks, to determine their fitness for concrete which might be subject to the solvent action of percolating water. Cylindrical specimens of concrete 8 in. in diameter and 6 in. in length were exposed for a period of eleven months to the percolating action of Croton water under a pressure of about 22 lb. per square inch. Each specimen was incased in a neat Portland cement mortar, 2 in. thick, except on the bottom, so as to give the water access only to the full end area and compel the entire flow to pass through it. The upper end, under the mortar cover, was covered with a layer of sand, 1 in. thick, through which the water flowed from the pressure pipe. The bottom was free. The proportions used in the concrete were 1 part Portland cement, 3½ parts crushed quartz and 6 parts broken stone. The proportions were measured by weight.

The outside edges of the metal should not be pushed in by the brooms when trying to get the water and binding over, but instead this should always be left until the driver has got the edges thoroughly down, so that the stones are not so liable to be displaced by the brooms.

To obtain a good finish to the coating I invariably have a slight sprinkling of chippings applied after the work has somewhat "dried out," but when this is done care should be taken to afterwards pass the roller over the whole surface of the roadway, as such chippings under these conditions are exceedingly dangerous to cyclists and deleterious to all rubber tired vehicles.

In making a new road over treacherous heavy or clayey subsoils I invariably have the excavations made extra deep and a good coat of clinker ashes put down, and then over this it is best to put the largest of the pitching, on which another coat of ashes will do no harm. I have, for instance, used such methods with advantage in taking out "knuckles" on severe gradients where the underlying strata was practically pure clay, which was got out to an average depth of about 3 feet.

Periodic analysis of the water coming through the specimens indicated, by changes in mineral content, a rapidly diminishing rate of solution, the solvent action practically ceasing after five months. Specimens containing granite and quartzite aggregates showed higher rates of solution than any of the limestones, with one exception. A strongly magnesian limestone showed the highest resistance of all in the series. The rate of leakage in all specimens decreased rapidly during the first six weeks and at a slower rate thereafter. The analyses of the percolating water seemed to indicate that whatever solution occurs within a mass of concrete affects chiefly the cement.

Tests of Mortar and Concrete

Permeability tests of mortar and concrete are reported in a recent "Bulletin" of the Engineering Experiment Station of the Iowa State College. In these tests comparisons were made to determine the effectiveness of reground cement and of the addition of clay. The investigators report that the specimens made of Portland cement alone were failures from the standpoint of impermeability, except those made of 1:2 mortar. Clay, contrary to the generally accepted conclusions, they state increased the permeability. Reground cement, on the other hand, gave satisfactory results. Northwestern States Portland cement was used in the tests. The reground cement was made from the ordinary Portland by grinding it for 14 hours in a ball mill; 98½ per cent. of it then passed a No. 200 sieve. The clay was dried and ground until 98 per cent. passed the same sieve. The specimens were made by filling forms of corrugated galvanized iron in the shape of the frustum of a cone, 4 in. in diameter at the top and 3 1-3 in. at the bottom. Some were 3 in. and some 6 in. thick. The pressure was 30 lb. to the square inch at the start, and after 6 hours was raised to 40 lb. This was maintained for 16 hours and the pressure then raised to 60 lb. and held for 7 to 22 hours. The report shows that most of the specimens, when broken open, except those made with reground cement, were largely or entirely saturated. The specimens made of 1:2 plain cement did not leak, but even these were found to be quite fully saturated when broken open. Reground cement was used in proportions of 1:2, 1:3, 1:4 and 1:3:5. All of them showed but very little penetration, and tensile tests of the mixtures indicated greater strength than similar proportions in which plain cement was used. In the tests with clay from 10 to 15 per cent of the cement was replaced by clay.

Mr. W. Maxwell, the Montreal architect, has just returned from a trip through Western Canada.

Features of Design of Infiltration Plants

A System of Water Purification Worthy of Closer Investigation—Preliminary Tests Required—Arrangement of Collecting Units—Cost of Installation

By Philip Burgess, Columbus, Ohio

The infiltration plant as a means of obtaining a public water supply is one of the oldest and possibly the least appreciated methods of obtaining pure water. There are many installations of filter cribs, galleries, etc., which have been in use for numbers of years and in some instances with marked success. On the other hand, there are many such plants that have proved failures in that they do not furnish water of constantly satisfactory quality. It is believed by the writer that many of the failures can be attributed to the lack of an understanding of the engineering problems to be solved in the installation of such plants, and in the following paper it is proposed to review briefly some of the features of design of various infiltration plants in which the writer has from time to time been interested.

Among the essential features which affect the installation of infiltration plants may be included, (1) the existence of a suitable bar of ample area within reasonable distance of the pumping station to which the water is to be carried; (2) the constant submergence of the bar beneath the stream, which much have velocity of flow sufficient to keep the surface of the bar free from deposited silt; (3) the permanency of the bar, which must not be materially shifted by action of the stream; (4) the quality of the ground water in the bar at the collecting system, especially as regards its hardness and iron contents; and finally, (5) the arrangement of the collecting units and the means provided for back-flushing or cleaning the system as it may become clogged from continued use. Lack of information relative to any of the above features may result in the failure of the installation.

The character of the filtering material is, of course, of great importance in determining the success of an infiltration plant. If the material composing the bar be fine or be cemented together, the quantity of water obtained in the collecting system may be too small. On the other hand, if the filtering material be too coarse, the water obtained may be of poor quality. The constant submergence of the bar at the collecting system is also of importance, because there may be marked decrease in the quantity of water obtained during low stages of the stream, especially if the collecting system be uncovered. Notwithstanding the fact that infiltration systems frequently are provided to collect a filtered river water, it is very necessary to know the character of the water which may be obtained from the ground, especially its hardness, which may be objectionably great, and its iron content, which may be sufficient to cause an objectionable quantity of iron in the water supply or to cause a clogging of the system by deposits in the collecting units.

Preliminary Tests Required.

The arrangement and location of the several collecting units comprising an infiltration system are effected largely by local conditions, including the character of the filtering material, the shape of the bar, the quality of the ground water and the means provided for back-flushing the system. Before discussing the arrangement of the collecting units, there will be considered some of the preliminary tests necessary at all places where the installation of an infiltration plant is proposed.

In general these tests comprise the determination of the quality and quantity of water available at the proposed location. The character of the filtering material in a bar is, perhaps, best determined by inspection, while its permanence may frequently be learned by local or government records. The determination of the quantity and quality of water available is more difficult and requires the installation of test wells at representative points at the proposed location. It is a common thought that the water contained in a bar beneath the river consists of filtered river water and not of ground water, but experience has shown the reverse to be true in most cases. Possibly the best method to determine the quality of the water in the ground is to drive perforated well points to the desired depth and to analyze the water obtained from these points after pumping from them for a sufficient length of time to secure representative results. One of the most striking features indicated by such tests made by the writer along the above lines is the considerable variation in the hardness and iron content of the ground water in the bar at points comparatively near together. Especially at Zanesville, Ohio, and at Parkersburg, W. Va., have there been obtained very striking results which indicated that, at a depth of 5 feet beneath the surface of the bar, and at points less than 50 feet apart, the hardness of the water in the ground varied from 60 to 300 parts per million and its iron content from 0.2 part to 12 parts per million. At Parkersburg, W. Va., most complete preliminary tests of the above nature were made covering a distance of some 3,000 feet in the river bar, along a strip about 200 feet wide located from 1 to 2 feet below extreme low water in the river. Approximately 100 well-point tests were made and, at the final location selected, the ground water was found to be softer than the Ohio River water and of low iron content. In some instances, however, at the location tested the total hardness of the ground water was approximately three times as great as that of the river water, and its iron content occasionally was greater than 10 parts per million.

The installation of an infiltration plant was considered for Sisterville, W. Va., and preliminary tests with well points there indicated a ground water of very unusual quality, containing an average of 1,100 parts of iron (as Fe) per million and 4,500 parts of chlorine per million, at a depth of but 4 feet beneath the surface of the bar. Three points approximately 1,000 feet apart were tested, and showed comparatively little variation. Such results clearly indicate, of course, that the water in the bar beneath the river was from ground sources and not from the river.

Tests with well points made at Newark, Ohio, driven to a depth of approximately 9 feet, indicated a ground water of approximately the same hardness as the maximum hardness of the river, and of a low iron content. Preliminary tests at Owensboro, Ky., indicated considerable variations in the character of the water with increased depths at which the tests were made, particularly as regards its iron content, which was objectionably high at depths greater than 6 feet.

Tests made with well points driven to 9 feet depth at Ironton, Ohio, at the five clusters comprising the collecting system, indicated variations in hardness of from 48 to 263 parts per million at points not more than 300 feet apart, and variations in the total iron content of from 0.1 part to 2 parts per million.

As illustrating the difference of opinion existing even among engineers as regards the source of water in the bars beneath the rivers, may be mentioned a report of two of the engineers employed to investigate the water supply for

Parkersburg, W. Va. In considering the possible use of a well system located along the river bank, the engineers recommended that, in order to increase the capacity of the wells during low stages of the river, the surface of the bar in the river be removed with a dredge boat to a depth of approximately 6 inches, thus allowing the water to flow from the river into the ground toward the wells. Evidence obtained by the well-point tests made in the bottom of the river appears to indicate that the flow, especially during low stages of the stream, is from the ground into the river, and not from the river into the ground.

The well-point tests discussed above are of great value in determining the quality of the ground water available in the bar at a proposed location, but it is also necessary to know the quantity of water available. Tests of the quantity may be made by sinking into the bar to the required depth a vertical well and by measuring the water which may be pumped from the well, which is left open at the bottom. Such tests made at Gallipolis and Newark, Ohio, on wells 4 feet in diameter indicated a flow of approximately 20 gallons per square foot per minute. At Ironton, Ohio, where the bar is comparatively impervious, the rate of flow from a 10-ft. well was approximately 5 gal. per square foot per minute. Approximately similar flows were obtained from the final collecting units installed subsequent to the preliminary tests, a fact which seems to indicate that such tests furnish a reasonably accurate measurement of the quantity of water available in a bar.

Arrangement of Collecting Units.

The character of the water in the ground and the depth of filtering material determine largely the size and general arrangement of the collecting units to be used in an infiltration plant. Generally speaking, the deeper the collecting units the larger the percentage of ground water obtained, and in cases where the ground water at depths of 9 or 10 feet is of satisfactory quality collecting units of large diameter placed in a horizontal position may be used to advantage, while in cases where the ground water at such depths is not of satisfactory quality small collectors at shallower depths are required. At Newark, Ohio, where the ground water is of satisfactory quality to a depth of 10 feet, horizontal perforated collecting units 48 inches in diameter and 12 feet long are placed at a depth of 8 feet beneath the surface of the bar, while at Parkersburg, W. Va., where the deep ground water is of poor quality, the collecting system comprises 5-in. brass Cook strainers placed horizontally 5 feet deep in the bar. At Ironton, Ohio, the collecting system comprises 20 vertical wells 4 feet in diameter, placed at a depth of approximately 9 feet. The maximum capacity of this plant during normally low stages of the river has been approximately 1½ million gallons daily, corresponding to a flow of 4 gallons per minute per square foot of well area. As previously stated, the bar at Ironton is comparatively impervious, a fact which explains the small capacity of the Ironton wells.

Provision for Back-Flushing.

An important feature to be considered in the arrangement of the collecting units is the provision for back-flushing. At Ironton, Ohio, the 20 wells were not divided into groups for separate flushing, but few of the wells were cleaned. Moreover, the water used for back-flushing has washed the material away from the wells, which have settled and broken their connections to the main suction. The plant now under construction at Parkersburg, W. Va., is to comprise 160 horizontal collecting units divided into five groups, each of which may be back-flushed independently. The necessary limitation i nthe volume of water available for back-flushing and the necessity of obtaining a good distribution of the water during flushing makes desirable the division of the units into as small groups as possible. Such a division, however, tends to increase the cost of installation, particularly of the suction pipes extending from the collectors to the pumping station. At Parkersburg, W. Va., the five collecting units are to be directly connected to the pumps by five 18-in. cast-iron suctions. The wells at Newark, Ohio, are divided into groups of two each, and gate valves are provided to flush each group independently.

In the above discussion it has been the endeavor to state as briefly as possible some of the features which the engineer must consider in the installation of an infiltration plant. The principal fact which it is wished to emphasize is the proposition under consideration. The many failures of filtration plants are believed to be due largely to lack of efficient engineering supervision during construction.

Cost of Installation.

In conclusion it may be of interest to mention the cost of installation of a few of the water purification plants of the infiltration type, although such figures are of but little value for comparative purposes. The plant at Owensboro, Ky., was installed at a cost of approximately $20,000 per million gallons daily capacity; that at Parkersburg, W. Va., is of a similar type and will be installed at approximately the same cost per million gallons. The plant at Gallipolis was installed at a cost of approximately $10,000 per million gallons capacity, and that at Ironton at a cost of approximately $50,000 per million gallon capacity. The plant at Newark is composed of horizontal collecting wells of large diameter, and was installed at a cost of approximately $6,000 per million gallons capacity.

The operation of an infiltration plant is generally accomplished at even less cost than that required to pump unpurified water from the stream beneath which the collecting system is located, and in the event that water of good physical and chemical quality is obtained in ample quantity, such a plant should be a marked success. The satisfactory quality of such a supply from a sanitary point of view may be assured by the use of a germicide such as hypochlorite of lime, and it will be of interest to the engineer to note whether or not the continued satisfactory use of such a germicide may lead to the installation of numerous infiltration plants operating with success from a point of view of economy and also of efficiency.

The Canadian Pacific Railway has awarded the contract for the construction of the huge dam on the Bow River at Bassano, in Alberta, which is to be used in connection with irrigating an additional 540,000 acres of land in the eastern section of the company's irrigation block. Messrs. Janse, McDonnell and Company have the contract for the earth work, and the Walker-Fyshe Company the contract for the concrete work. In connection with the work, 800 mules that have been employed at the Panama canal will shortly be shipped to Bassano. A force of about 2,500 men will be organized, and the work will be started at the opening of the spring.

The corporation of British Columbia Land Surveyors have elected the following officers for the ensuing year; President, E. A. Cleveland, Vancouver; vice-president, W. S. Gore, Victoria; secretary-treasurer, S. A. Roberts, Victoria.

A meeting of the Winnipeg unions was addressed last week by Mr. T. R. Preece, Indianapolis, Ind., first vice-president of the Bricklayers, Masons and Plasterers' International Union. It is stated to be the intention to adjust the year's business well ahead of operations so as not to cause any interference with the busy building season.

Mr. John Wilson has been appointed city engineer of Fort William, vice H. S. Hancock, jr., resigned.

Municipal Engineering at New Westminster

J. W. B. Blackman, City Engineer, Furnishes Evidences of Activity—Progressive Policy of Improvement Typical of all British Columbia — An Interesting Report

The annual report of Mr. J. W. B. Blackman, city engineer of New Westminster, B.C., indicates considerable activity in the Royal City during 1910. Plans and specifications were prepared for the Eighth street sewerage system, which consists of over 14 miles of vitrified pipe. The total mileage of sewers in the city is 30.65. Reports have been made and specifications prepared for a considerable amount of street improvement work, which promises well for 1911.

Last year improvements were practically completed on Columbia street at an expenditure of $104,950. The amount of authorized extras for the city was only $967. The year witnessed the completion of the First street sewerage system within the amount estimated.

The engineering work has been completed for the Second, Third and Fourth street improvement schemes, which entail an expenditure of $133,850. The following extracts from Mr. Blackman's report contain several items of interest:

Report on Progress of Laying 25-in. Main.

The contract for laying the new 25-in. water main from Coquitlam Lake to the city was let on June 27th, 1910, to the Municipal Construction Company, of Vancouver. The contractors commenced in August last, and work has been carried on continuously since that date, except for unavoidable delays due to hard weather. Up to the 31st December a total length of three and two-fifths miles of 25-in. pipe had been laid and completed. A length of four-fifths of a mile had been completed at the upper or lake end of the line, and two and three-fifths miles have been completed from the lower construction camp established about two miles north of Westminster Junction. Very good progress has been made at this camp, nearly one mile of pipe having been laid in a month.

Columbia Street, New Westminster, B.C.

In the Mountain section many difficulties have been met with, these being the cause of the small amounts of pipe completed. The trenches are close to the steep hill slopes, in treacherous clay, the ground being full of water and difficult to excavate. The annual mean rainfall at the lake is as high as 160 inches, and much delay is due to rain and bad weather.

At times it has been found impossible to lay more than one pipe length (22 feet) in one day. All, or nearly all, the most difficult part of the work is now completed, and it is expected that the whole of the upper portion of 5¾ miles will be finished in March. This will leave three months to complete the remaining portion of 8¼ miles from Westminster Junction to the city, and with two construction camps and no serious difficulties in the way, this should be accomplished. This will call for under 400 feet of pipe to be laid per camp per day, and after making all allowances for bad weather and unavoidable delays there should be no difficulty in completing the whole of the work by the contract date of July 1st, 1911.

Every care is being taken in laying the main. All joints are carefully inspected before being covered in, and the whole of the work is being done in workmanlike manner.

The Lulu Island branch has been laid from the city limits of Lulu Island to within a few hundred feet of the bridge, and on the mainland side, from the bridge to the foot of Royal avenue, making a total of two miles laid on this section, or a grand total of five and two-fifths miles on the whole scheme. Messrs. McDonald, the manufacturers of the steel pipe, have completed all the work on the straight pipe. All the tests that have been placed on these pipes have proved highly satisfactory. Every rivet, and every pipe has been inspected before leaving the shops.

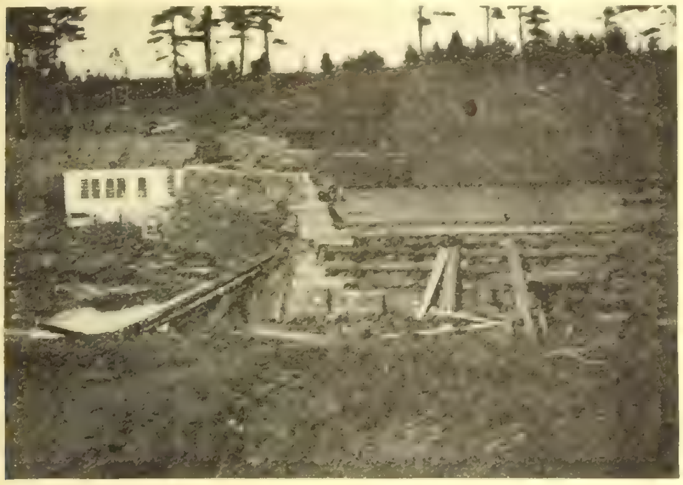
For the work to be done in the city (but not yet started) I estimate the value of the schemes prepared, contracts let, etc., at $280,000, for which this department should be credited with one per cent. for engineering work, and also with $1,000 for general city work, such as giving street lines and grades, preparing building by-laws, reports, etc. On making these very moderate deductions I find that the actual work completed in the city this year has cost only two per cent. for engineering expenses and inspection.

Mr. M. B. Logan has recently severed his connection with Siemens Bros. Dynamo Works, Ltd., and has opened up offices with Mr. C. T. Bowring as Consulting Engineer under the name of Bowring & Logan, at 34 Victoria street, Toronto. Mr. Logan, who is well known in Toronto, has for a number of years been connected with Siemens Bros., both in Europe and Canada. Mr. Bowring has had long experience in the United States with the Westinghouse Electric & Manufacturing Co., and been identified with a large number of their installations.

The important water power development now being carried out at Jordan River, Vancouver Island, by the Vancouver Island Power Company, Limited, a subsidiary company of the B. C. Electric Railway Company, Limited, is making excellent progress, about 90 per cent. of the first installation having been completed. During the past summer an average of between 1,000 and 1,500 men have been employed. At this date, owing to the very wet weather, the force is cut down to about 300. Most of the pipe has been received and is now being placed. The majority of the electrical and hydraulic machinery is also being put in position. Owing to the weather conditions it is not expected that it will be possible to finish the first installation until well on in the spring.

New Plant for Shediac, N. B.

The Shediac Electric Light Company, of Shediac, N.B. started up their new plant on December 1st, 1910. The equipment consists of two 18 inch Kennedy water wheels and a C. G. E. 75 k.w. 2,300 volt, 60 cycle generator. The transmission line is 3½ miles long. The street lighting is by series tungstens with Westinghouse regulator. Forty 32 c.p. units have been installed to date. Mr. E. A. Smith is the managing director of the company.



75 k.w. Hydro-Electric Plant for Shediac, N. B.

Cost of Tarvia Pavement at Fredericton, N. B.

Tarvia pavement was laid at Fredericton, N.B., during 1910 at a cost of $1.04½ cents a square yard, according to information furnished by Mr. John L. Feeney, city engineer, who reports as follows:

During the past season two blocks of tarvia pavement were laid on Queen street from St. John to Regent streets and from York to Westmoreland street. The pavement was hardly in use long enough to competently judge of its quality, but it gave ample evidence of being sufficiently durable for the traffic of this city, which was the only thing upon which fears were entertained as to its suitability; moreover, the cost, as can be seen from the following figures, is well within the range of a city the size of Fredericton.

Amount of Pavement Laid.

Queen street—York to Westmoreland—3,080 sq. yards.
Queen street—St. John to Regent—2,502 square yards.
Total amount—5,582 square yards.

Stone.

The road metal used in the construction of these blocks was nearly all 1½ to 2 in. trap rock, though a small amount of sand stone was of necessity used on the lower one. The stone was purchased from the roads and streets department, to whom the permanent street department is indebted for the following amount:

1,603 tons crushed trap rock at $1.30	$2,083.90
130 tons sand stone at $1.00	130.00
Total	$2,213.90

Binder.

The binder material used was Tarvia X, which was applied hot to the road. Two applications of the binder were used on the wearing course and also on the top dressing. This material is manufactured by the Barret Manufacturing Company, of Boston, Mass., and was purchased through that company's Maritime Provinces branch, the Carritte-Paterson Company, of St. John, N.B., at a cost of $5.25 per cask of forty imperial gallons, landed in this city.

The total amount of tarvia procured from this company was 378 casks at a cost of $1,984.50; of this number 357 casks were used, leaving 21 casks now in stock for next season; of the empty casks 345 were returned to the company, netting the city the sum of $94.15. Thus the total cost of tarvia used was the cost of the 357 casks, viz., $1,874.25, less $94.15—$1,780.10, which is equivalent to 12.5 cents per imperial gallon.

The amount of tarvia used per square yard was 2.56 imperial gallons (3.07 U. S. gallons), of this amount two gallons were used on the wearing course and 0.56 gallons on the top dressing.

Sand.

This was used on the finished surface of the pavement. The total amount used was: 45 loads at $1.25 per load, making a total cost of $56.25. The amount used per 100 square yards was 4.6 cubic yards.

Cost of Pavement.

Since all tar-macadam roads have for their essential features (1) A macadam foundation, and (2) some form of coal tar binder, the following itemized statement shows (1) the actual cost of the macadam road in itself and (2) the actual cost of the tarvia binder and everything incidental to its use.

Statement Showing Cost of Macadam Road.

Broken stone	$2,213.90
Labor	459.75
Teaming	412.54
Rolling	114.99
Engineering and superintendence	303.78
Sundries	44.33
Total	$3,549.29

Cost per square yard, 63½c.

Statement Showing Cost of Tarvia Treatment.

Tarvia	$1,780.10
Labor incidental to heating, application, etc.	315.22
Cost of plant, tools, etc.	133.30
Sand	46.25
Total	$2,284.87

Cost per square yard, 41c.

The total cost of the pavement proper was thus $5,834.16, or a cost per square yard of $1.04½, which is a very low figure, more especially when consideration is given to the following facts:

(1) That the past season was the first attempt in this city in the construction of tar-macadam roads.

(2) The cost of tarvia in this city was 12.5 cents per imperial gallon, whilst the same product can be procured in New England cities at a cost of ten cents per imperial gallon.

The essential features in the low cost of construction were (1) low cost of crushed stone in comparison with other cities; (2) the short haul; (3) the small amount of excavation necessary.

Mr. Donald S. Barton, formerly manager Quebec Electric Light Company, has been appointed Consulting Electrical Engineer, with special duties, of the Quebec Railway, Light, Heat and Power Company. Mr. C. J. Pigot, formerly Secretary and Roadmaster of the Quebec Railway, Light & Power Co., has been appointed Chief Engineer of the same company, in succession to Mr. E. A. Evans, resigned. Mr. Pigot will have charge of all construction work (except electric) track and roadway, real estate and buildings and general engineering.

Reinforced Concrete for Long Spans for Light Loads

Among the important papers presented at the recent meeting of cement users in Chicago was one by Emile G. Perrot, architect, relating to the above subject, from which we take the following:

While there has been no doubt of the economy and practicability of reinforced concrete for massive construction and where heavy loads are carried, the advisability of its use for light floor loads, especially if the spans are long, has been questioned even by those who favor its use in other instances. The dead weight of the material itself has often operated against its use, especially where the carrying capacity of the soil required the unit pressure to be kept to the minimum, or from other like causes.

We all agree that clear spans of forty or fifty feet in buildings are not usual and are generally avoided on account of their increased cost; hence a description of such a span, with its cost as compared with steel girder construction for the same span, is of interest.

While the author does not wish to take any credit for originality in the design of this floor, as the same general scheme has been used many times before for shorter spans, it is because of the unusual length of the span that its details become an important factor in the design.

The Floor Spans.

The spans in question form the floors over the swimming pool and gymnasium of the Turngemeinde Club House, Philadelphia, and are 53 ft. 1⅞ in. clear span. There are two floors with these spans, of an area of about 4,700 sq. ft. each, having five girders on the first floor and six on the second floor, spaced 13 ft. 9 in. centers. Those of the first floor are only 36 in. deep below the joist, on account of head room. The top portion or T-head is 5 ft. 4 in. wide and 14 in. thick. These girders are reinforced with twenty-one 1⅛ in. square twisted bars, and the stirrups are 1 x ⅛ in. flat iron. Great care was taken to place the in the bottom of the moulds on cast cement chairs, while the spacing of the bars and stirrup was maintained by iron rods and the wiring of one bar to the other.

The floor panels between the girders consist of 5 x 12 in. concrete joists, with a 2 in. reinforced concrete slab over same, and 12 x 12 plaster block centers between each joist, thus making a flat ceiling between girders. The joists are reinforced with one 11-16 in. square twisted bars and eight ¼ in. stirrups. In the top of every third joist were placed two ¾ in. square twisted bars over the girders to act as tie. These rods were only 5 ft. long, but two were used in each case, lapped in the center so as to project beyond the T-head into the joists. The slab is reinforced with ¼ in. rods run in both directions, 12 in. on centers or thereabouts.

Girders for Auditorium Floor.

The girders supporting the auditorium floor, on account of the higher ceiling, are 42 in. deep, with T-head, 4 ft. 9 in. wide. The reinforcement in the bottom consists of eighteen 1⅛ in. square twisted bars, bent the same as for first floor.

Each floor is designed for a live load of 120 lbs. per square foot, as the top floor is an auditorium and the floor below a gymnasium.

There seemed to be some doubt amongst the members of the Building Committee as to the advisability of constructing such long span of reinforced concrete, but in order to obtain the actual difference in cost between steel and concrete, we designed the girders of Bethlehem steel girder sections, reinforced with top and bottom cover plates and properly fireproofed. The size of the steel girders was 30 in. deep, 200 lbs. per foot, with two cover plates on each flange, one ⅝ x 15 in. and one ½ x 15 in. We obtained bids from the building contractor for the difference in cost of these girders, we having likewise made an estimate of the difference in cost. The contractor's price for them was $6,500 additional to his contract price, although our estimate of the difference was somewhat less, being $4,664, based on prices obtained from outside sources. Taking our figures as a basis, as there are 5,400 square feet in the two floors, the difference in cost for the structural steel, fireproofed, is 50 cents a square foot more than the reinforced concrete, with no increased advantage.

The weight of the structural steel for a girder, as compared to the weight of reinforcing steel, is as follows:

Total weight of steel girders, with strap iron reinforcement for fireproofing and bearing plate, about 17,000 lbs.

Total weight of reinforcing steel in one reinforced concrete girder, 36 in. deep, 5,500 lbs.

This shows that it takes about one-third the amount of steel for reinforced concrete as compared with structural steel for girders and beams. The amount of saving in concrete would be the overhanging portions of the T-head, which amounts to 2¼ yards per beam, when the extra thickness of concrete on the girders is taken into account, due to the wide flanges on the steel girders; likewise there would be additional plaster blocks necessary to take the place of the T-head omitted, the cost of which would have to be deducted from the saving effected by omitting the T-head.

The sub-contractor for the reinforced concrete work gave the cost of the plaster blocks, delivered at the job, as 14c per square foot, and setting of same, including the nailing on of a fine wire screen at each end to prevent the concrete running into the hollow part of the block, as three cents a square foot additional.

The Plaster Blocks.

The plaster block weighs 25 lbs. per square foot, as compared with 40 lbs. per square foot for terra cotta tile, which cost the same price as the plaster block, but which are not as easily handled, being only 12 in. long, whereas the plaster blocks are 3 ft. long and can be sawed to fit any position.

The walls of plaster blocks are about 1½ in. thick, and there are two cells in each block, separated by a vertical wall in the middle, which strengthens the block so that traffic can take place over them before and during the time of pouring the concrete.

Immediately before pouring the concrete it is necessary to thoroughly soak with water the plaster blocks, as they absorb a considerable quantity of water from the concrete if not thoroughly wetted; in fact, the parts of the floor where the blocks occur and where they do not are clearly marked during the earlier stages of the setting of the concrete by the difference in its color, the concrete which does not come in contact with the plaster requiring more time to set.

For moderate spans the use of concrete joists with either the plaster block or tile filler are desirable, where a flat ceiling is sought and the load light.

In the last two years Canada has lost $47,000,000 by fire. Consul General James W. Ragsdale, of Halifax, says that this means a per capita tax equal to $3.35 per annum for every man, woman, and child, and if the census ratio of one adult man for every five of population is considered, then it means an annual loss equal to $16.75 for every Canadian family. This is a loss far greater than that of any other country. In Austria the per capita loss during the same years was 29 cents; Denmark, 26 cents; France, 30 cents; Germany, 49 cents; Italy, 12 cents; and Switzerland, 30 cents.

The contract for the depot to be established by the marine and fisheries department at Prince Rupert, consisting of a reinforced concrete wharf 405 feet long and 50 feet wide with a long approach and eight frame buildings, including a buoy warehouse, power house, offices and residences, and a coal bunker to be erected on the end of the wharf has been awarded to the Pacific Coast Construction Company, of Victoria. The contract price is about $200,000. The work will be completed by the end of the year.

Stability at Vancouver, B. C.

Steady Progress the Feature of the Situation —A New Record for January—Market Prices

Office of the Contract Record,
Vancouver, B.C., Feb. 9, 1911.

In general, building throughout the city is active and steady. Labor conditions are satisfactory, and material is fairly easy to obtain.

The largest permit of the last few days was one for a 12-storey office building on Granville street for P. Burns & Company. There will be twenty-six offices to the floor. The cost is estimated at $400,000.

Recent developments point to the vicinity around the southern end of Homer street becoming the wholesale house district of the city. A great many wholesalers have lately built houses in that direction which rival the warehouses of Toronto and Winnipeg. Many buildings are under way and promised, and the demand has doubled property values in that district within a year.

The Canadian Pacific Railway plan the construction of a new depot and steamship wharves, the present buildings being entirely inadequate for the growing needs of traffic. No sums have been mentioned in reference to the cost of these improvements, but it is known that they will run well into the millions.

The many public works sanctioned by the people on election day are now nearly all under way.

January's building permits mounted up to the magnificent total of $1,412,000. This is the announcement at the city hall by the building inspector. Compared with the figures for the corresponding month of last year there is an increase of $781,000, or 125 per cent., most creditable figures.

Early in the month the building inspector made the statement that he expected 1911 would see fifteen million dollars of permits issued, and if January can be taken as a basis, he should certainly make good. It is a coincidence that 144 permits were granted in both Januarys, an indication of increasing confidence on the part of the business men.

Work on the quarter million dollar annex of the Vancouver Hotel is proceeding apace. The foundations have just been completed and the erection of steel has been started.

Building material, taken all round, is plentiful. Following are the prices that obtain: Brick, No. 1 dry red pressed brick, $50 per M.; No. 1 dry buff pressed brick, $50 per M.; red stock bricks, $13 per M.; Wire cut bricks for foundation work, $12 per M.; No. 1 enamelled brick, all colors, $90 to $160 per M.

Cement, $3.25 a barrel; lime, $1.35 a barrel; sand, 75c. a yard; gravel, $1.75 a yard; plaster, fibred and unfibred, $16.00 a ton; sacquet plaster board, 25 cents a yard.

Building papers: Tarred, 90 cents; white, 70 cents; rosin sized, $1.25. laths, $2.00 M.

Paints: White lead, 8½ cents. boiled oil, $1.35; raw oil, $1.33; mixed paints, $2.25; turpentine filler, $1.50; patent dryer, 10c. pound; turpentine, $1.50 gal.; Barry Bros. liquid granite, $3.25; Luxbury, $2.75; flowing coach, $2.25; hard oil finished, $2.25; furniture varnish, $1.00; Japan dryer, $1.00; black Japan, $1.25.

Foretastes of Activity at Montreal

Office of the Contract Record,
Montreal, Feb. 10, 1911.

Building permits totalling $330,365 were issued in January, covering 58 buildings. The Y. M. C. A. contract, which will cost $300,000, will be included in the February total. The greatest activity prevails in the architects' offices in connection with residential properties, an idea of which can be gathered from the contracts department. One of the most striking buildings will be the McGregor street house, a feature of which will be a large oval dining room in the center of the first floor and a large billiard room which is to be erected in the basement. Two prominent real estate firms have recently branched out into architectural and construction work, these being the house of Brown and Colonial, real estate, the latter being a branch of the Henry Morgan departmental store. Colonial House, it is stated, will have its own brick manufacturing plant running by the summer.

Considerable extensions are spoken of at the C. P. R. Angus shops, whilst some of the largest engineering firms are looking round for room for expansion to make ready for the increased business expected this year. At the present time it is impossible to find a pessimist in either the local building or engineering circles.

Canadian Railroad Development

Green & Burdick Bros., Victoria, B.C., are securing the right of way for the first 20 miles of the Victoria & Barkley Sound Railway. Already a number of contracts have been entered into with the owners of land, and it is anticipated that the necessary right of way between Victoria and Sooke will have been purchased within a short time. Construction work will commence at the Victoria end of the section, probably some four miles from Victoria.

Among the other railroad matters which will shortly come before parliament, the Hudson Bay, Peace River & Pacific Railway Company will apply for incorporation. This company proposes to build from Port Nelson to Fort Churchill, then westerly to Fort Vermilion on the Peace River, thence southeasterly to Fort S. John, thence westerly to Laurier Pass and on to Port Simpson, also from St. John to Edmonton. The Aisek & Yukon Railway will apply for an extension of time for construction for legislation to expend 15 per cent, of the amount of its capital, for four years, and for completion in seven years. The Dominion Development Company will seek incorporation. It proposes a line to run from the Nass River on the Portland Canal to Fort Churchill and Port Nelson.

There has been a considerable amount of railroad construction during the past year in the vicinity of Moose Jaw, Sask. During the past year the Grand Trunk Pacific has had its line approved from Regina to Moose Jaw, paralleling the main line of the C. P. R. on the north side. Construction work on this line has already started and will be carried on to completion during 1911. An extension of this line is planned running northwesterly from Moose Jaw between the main line of the C. P. R. and the Moose Jaw-Lacombe branch of the Saskatchewan River. The route of this line has not yet been approved by the railway committee at Ottawa. The Canada Northern Railway has also had approved during the past year a line running from Regina to Moose Jaw on the north side of the proposed G. T. P. line to a point in township 17, range 24, w. 2nd, where it intersects the G. T. P. line coming into the city toward the north. This road will be started at an early date. Construction work has been active on the Maryfield extension of the C. N .R., which enters from the south, and this road is graded to New Warren, a point about thirty miles southeast of Moose Jaw. The route of this line has been somewhat diverted since the original survey and instead of coming in close to the C. P. R. at Pasqua, it runs in a more westerly direction. The line has now been surveyed to the city limits, but it has not yet been made public where it will enter the city. The C. N. R. has another proposed line running from Moose Jaw to the south side of Lake Johnston, thence in a northwesterly direction to Swift Current. This route has not yet been approved at Ottawa, but will be under consideration during the present month. The Alberta Central has also obtained approval for a branch from Red Deer, Alta., to Moose Jaw. This line will approach Moose Jaw from the northwest, crossing the Saskatchewan River at a point somewhat between the Moose Jaw-Lacombe branch and the main line of the C. P. R.

C.N.R. Pacific Terminus Located

The exact location of Port Mann, the Pacific terminus of the C. N. R., has been settled on a site of 4,000 acres, 1½ miles from New Westminster, on the south bank of the Fraser river. The future city will have a river frontage of 2½ miles. Contracts have already been let and 350 men are at work clearing the ground of the standing timber. By the end of May it is expected that every thing will be in readiness to permit of the preliminary surveys being made. Warehouses, elevators and wharves are to be constructed as soon as possible, and it is estimated that when these works are put up, together with the railroad and repair shops, which are also to be erected in readiness for the completion of the British Columbia section of the C. N. R. that they will support a population of 10,000 workers. Large coal docks are to be established for the purpose of handling the shipments from the Dunsmuit colleries at Vancouver Island.

G.T.R. Terminal Construction at Ottawa

Mr. Alex. Gray, resident engineer of the Grand Trunk at Ottawa, in an address before the Ottawa branch of the Canadian Society of Civil Engineers this week, gave an outline of the work already done in the company's terminal in this city. Already it has spent about $2,000,000. This includes only a portion of the cost of the hotel and station which are only partially completed. The changes will increase the yard accommodation very greatly. The accommodtaion in the freight yard is increased 50 per cent. and with better facilities than before. The changes in the freight yards alone have cost the company $45,000.

He stated that it was the intention of the company to build a large train shed at the rear of the new station. It will be 500 feet long and wil cover the entire eight tracks. It will be of the Bush type similar to that of the Lackawanna terminal at New York. The roof will be of glass, in iron or steel frames, and will be supported by steel. There are open spaces over the funnels of the engines. It will extend from the baggage annex on the east and the western side will rest on the retaining wall already built by the company along the Rideau canal. Details of the shed have not yet been determined. The platforms between the tracks will be of concrete. The entire width of the sheds will be about 182 feet.

Mr. Gray gave a good description of the building of the big retaining wall along the canal. This wall is 1,079 feet long and average 17 feet in height. It contains 2,880 cubic yards of concrete. There was considerable difficulty in the construction on account of the foundation. It had been expected that the foundation would be all rock. However, at one point it was of boulders and gravel. For this 137 feet the retaining wall is built on concrete piers. These piers are 9 feet 10 inches by 5 feet and are an average depth of 14 feet below the base of the wall. The piers are 14 feet apart from center to center. They are joined together by a concrete slab 2 feet thick which is reinforced with old rails. The wall is designed to carry 5,000 lbs. per foot. The work was started on February 20, 1910, and completed on May 1 of the same year. The cost of this wall was $24,050.

Mr. Gray stated that interlocking switches would be installed in the yard. By this means when one switch is opened all the rest close automatically. The switches will be moved from a tower.

Personal News and Notes

The Brockville town council has abolished the office of town engineer. In future all works will be carried out by special appointment.

Mr. H. S. Hancock, jr., formerly city engineer of Fort William, and Mr. G. P. Astell, until recently a member of his staff, left last week for Vancouver, B.C.

The Lord Strathcona cup, the premier prize of the Strathcona Curling Club, was won by City Engineer A. J. McLean, who defeated Mr. S. Kelly, city electrician.

Hon. Geo. Graham, Minister of Railways and Canals, was in Montreal last week in conference with Messrs. Vautelet, M. J. Butler and H. L. Hodge, the Quebec bridge experts.

Mr. J. W. Longbottom, a Toronto building contractor, died last week at his residence in that city, 74 Northumberland avenue. Deceased was born at Bolton, Ont., 58 years ago.

At the recent convention of the Alberta Association of Architects at Calgary a committee was appointed to discuss the best means for obtaining a contract form for general use throughout the province.

The Guelph, Ont., Board of Works are about to invite applications for a new city engineer. The present official, Mr. James Hutcheon, finds that it is impossible for him to devote his whole time to civic work.

Increased activity is expected by the building trades this season at St. John, N.B. The master carpenters of that city are expected to demand an increase to $3 a day, but probably this will be arranged satisfactorily.

A number of English capitalists will build a $300,000 hotel at Saskatoon, Sask., the contract having been let to the Winnipeg firm of Carter-Halls-Aldinger. Messrs. Brown & Vallance, of Montreal, are the architects.

The will of the late F. B. Polson, of the Polson Iron Works, which was filed for probate last week, discloses the fact that Mr. Polson owned 2,998 one hundred dollar shares in the iron works which bears his name and $11,000 in real estate and other holdings.

Exceptional winter building activity is a feature of the situation at Winnipeg. For the first time work has been maintained throughout the winter with practically no interruption. It is reported that in addition to the work under way contracts aggregating $11,000,000 have been awarded.

The London, Ont., Board of Water Commissioners have decided to impose a penalty of $9,200 on the Canadian Westinghouse Company for non-fulfilment of a contract for the installation of certain electrical machinery and apparatus which was delayed from October 28th until the middle of last month.

The following names are mentioned in connection with the vacancy caused by the death of Mr. J. E. Schwitzer, late chief engineer of the C. P. R.: F. F. Busteed, at present general superintendent on the Pacific coast; F. P. Gutelius, general superintendent at Montreal, and J. G. Sullivan, at present the assistant chief engineer in Montreal.

We regret to report the death of Mr. Geo. McFarland, a well known building contractor, of Vancouver, B.C., which occurred last week in that city. The late Mr. McFarland was born at Niagara-on-the-Lake, Ont., 70 years ago, and went to British Columbia about 1890. He carried out important contract work at Vancouver, Victoria, New Westminster and Nelson.

Mr. Isaac Laurin has instituted a $50,000 suit against the city of Montreal for alleged patent infringement. Mr. Laurin claims that the water department has adopted an effective device invented by him for draining hydrants out so as to prevent freezing. For this he received no recom-

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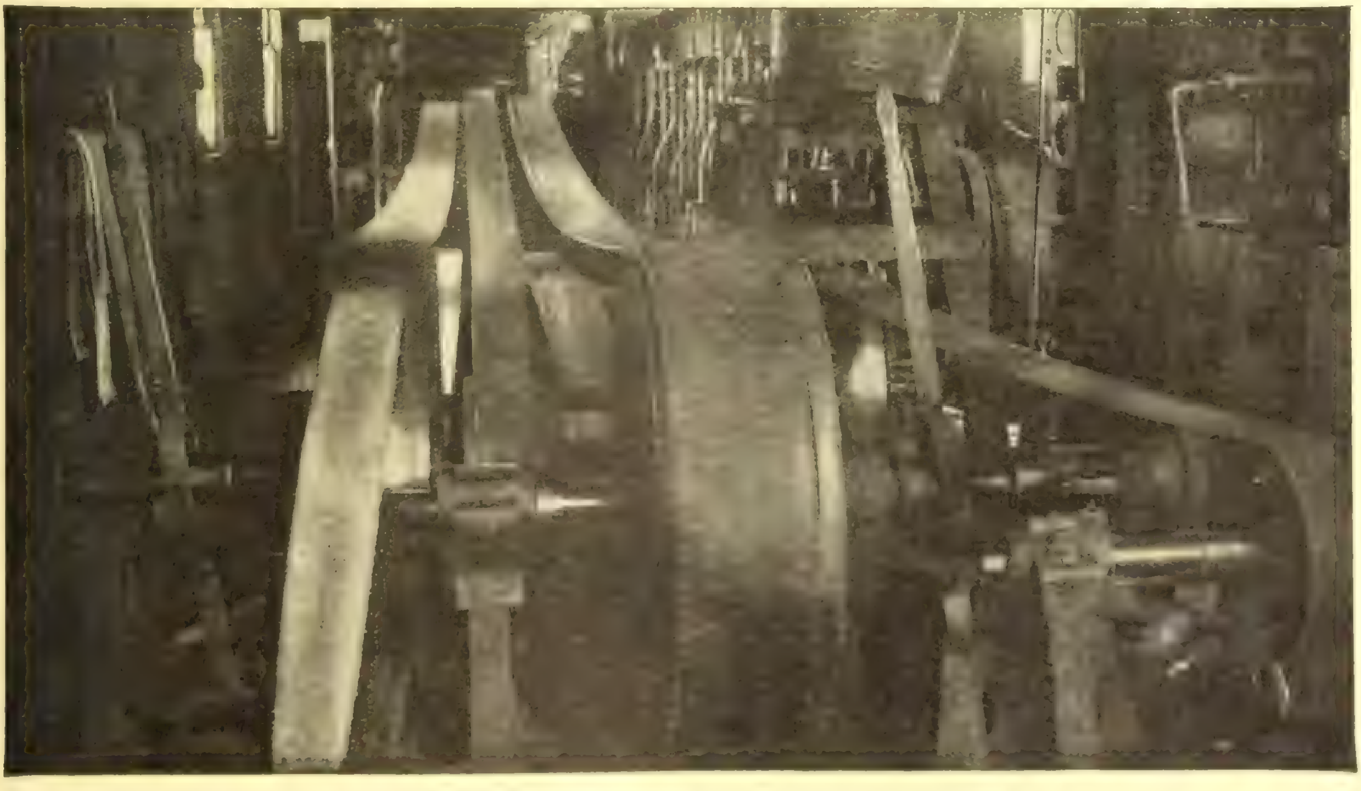

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pense. The city officials, Messrs. Janin and Lesage, claim that this identical pattern of hydrant has been in use for the last thirty years.

The annual report of Town Engineer Johnston, of Berlin, Ont., shows that the sum of $146,638 was expended in local improvements during 1910. Four miles of cement walk were constructed at a total cost of $11,642. Concrete curbs and gutters represented $3,714.

City Surveyor Barlow, of Montreal, was complimented by the Board of Control on the expeditious manner in which his department has succeeded in clearing the streets of snow after the big storm. The expense of the recent blizzard to the city are estimated at $40,000. On one day 1,300 teams were engaged. There are 500 miles of sidewalks in the city to clear.

City Engineer Rust, Mr. Kenneth Aitken, city electrical engineer, and Mr. J. W. Moyes, consulting engineer, all of Toronto, were in New York last week gathering information upon the construction and operation of the Edison storage batteries. Mr. Rust also obtained estimates for the building of motor busses, for purpose of comparison with figures submitted by English firms.

Mr. Allan Purvis, manager of the interurban lines of the British Columbia Electric Railway Company, has informed the president of the Burnaby Board of Trade, Mr. B. G. Walker, that the company will erect, in the near future, a fine station at Edmonds, which is situated just on the city limits in Burnaby. The station will be after the style of the one at Chilliwack, with inside waiting rooms, electric heating, etc.

At a recent meeting of the Winnipeg branch of the Canadian Society of Civil Engineers there was a further discussion of the paper given by Mr. W. G. Chace at the annual convention of the parent society. Those who took part were W. M. Scott, Professor Brydone-Jack, J. J. Aldridge, D. A. Ross and others. The opinion was unanimous that the methods employed and the progress made on the plant were eminently satisfactory.

James C. Kennedy, civil and hydraulic engineer, Vancouver, spent the week of January 16-21 in Winnipeg attending the annual meeting of the Canadian Society of Civil Engineers. On his way back Mr. Kennedy spent a few days at the famous Coldstream Ranch near Victoria, B.C., where he is superintending the carrying out of an extensive irrigation project. Recently Mr. Kennedy removed his office from the Flack block to Suite 413, in the new Pacific Building, corner Hastings and Howe streets.

The Glidden Varnish Company have sent a special representative to South Africa to place their concrete finishes and waterproofings among the architects and engineers. Their Mr. Tornero, a native of South America, sailed on January 25th to locate permanently in Buenos Ayres, where he will have entire charge of the development of the concrete coating business of the Glidden Varnish Company, as pertaining to South American countries. Demands for the Glidden products are coming from every quarter of the globe and their export business during the past year in concrete finishes was enormous. Their principal sources of outare India, South Africa, China and South America.

A Dominion patent was secured four years ago under the name of Tarlithic for a pavement which has since been laid in Collingwood, Chatham and Guelph, and has proven in each case highly satisfactory. Tarlithic has been used extensively in England for years. It is composed of a concrete foundation, and a wearing surface three inches thick of broken stone, cement, and certain gas tars, spread on the foundation in layers and rolled after each layer is spread with an 8-ton roller. The surfacing materials are heated before being placed on the roadway, then allowed to cool, allowing all the gases to escape before being compacted. The finished pavement presents an excellent appearance and has the advantages of economy, durability, noiselessnes and sanitation. The Fielding Paving & Construction Company, of Chatham, Ont., and John Conn, of Windsor, Ont., are behind the proposition.

Quebec Builders' Exchange

The annual meeting of the above body which was held on February 3rd, was presided over by Mr. E. T. Nesbitt, who was re-elected president. The remaining officers were appointed as follows: Vice-president, A. Picard; secretary-treasurer, J. D. Lefaivre; directors, E. T. Nesbitt, C. E. Morrisette, L. H. Gaudry, A. Picard, A. Dugal, G. A. Marier, L. H. Peters, J. E. Marineau, J. L. Lachance, P. A. Lamonde and N. Barbeau. The delegates elected to represent the Exchange at the annual meeting of the C. N. A. B. now being held in Winnipeg were Messrs. Picard, Gaudry and Lachance. The second annual dinner of the Exchange will be held at the Kent House, Quebec, on February 25th.

The Late Roderick McLennan, C.E.

A distinguished career was ended recently by the death of Mr. Roderick McLennan, C.E., at his home in Toronto. The late Mr. McLennan was born at Glengarry in 1823 and was the son of Scottish parents. On leaving college he engaged in railway construction in the Southern States as an engineer, and was identified with such lines as the Georgia Central and South-Western Railways.

In 1864, while trying to return to Canada, Mr. McLennan was taken prisoner by the Confederate soldiers, and detained for thirteen weeks. On arrival in Canada Mr. McLennan worked on the Intercolonial Railway, and later did survey and exploration work in British Columbia. In 1872 he was made district engineer of government railways between Port Arthur and Winnipeg, and afterwards became chief engineer of construction for the C. P. R. on the Lake Superior division. Mr. McLennan took up his residence in Toronto in 1885. He had been living in retirement for the last fifteen years.

Reinforced Concrete Barges and Pontoons

We are in receipt of an interesting little booklet on the above subject from James Taylor, consulting engineer, Montreal. The history of concrete boats, as set forth in this folder, dates back to 1850, when a Frenchman named Lambot constructed one, exhibiting it five years later at the Paris Exposition. This is supposed to be the first reinforced concrete structure of any kind. Lambot patented the invention, believing that the material was well adapted to boat building. From that date, however, no further development took place until in 1907, the Signori Gabellini, an Italian firm, took the matter up on a large scale, and constructed a concrete barge of 150 tons for use on the Tiber and the coast. This boat has been in continuous service ever since and proved thoroughly satisfactory in every way. Since then concrete boatbuilding has made rapid progress in Italy and France, and there are now large numbers of barges and pontoons, of this construction and fo all sizes, in use in these countries. As an illustration of the adaptibility of this material for marine floating structures, it may be stated that the Italian firm mentioned above have built six car ferries for the Italian State Railways, each 158 feet long and each capable of transporting six freight cars. Concrete boat building has thus passed the experimental stage and it seems to us that this form of construction is worthy of the investigation of the engineering and contracting interests.

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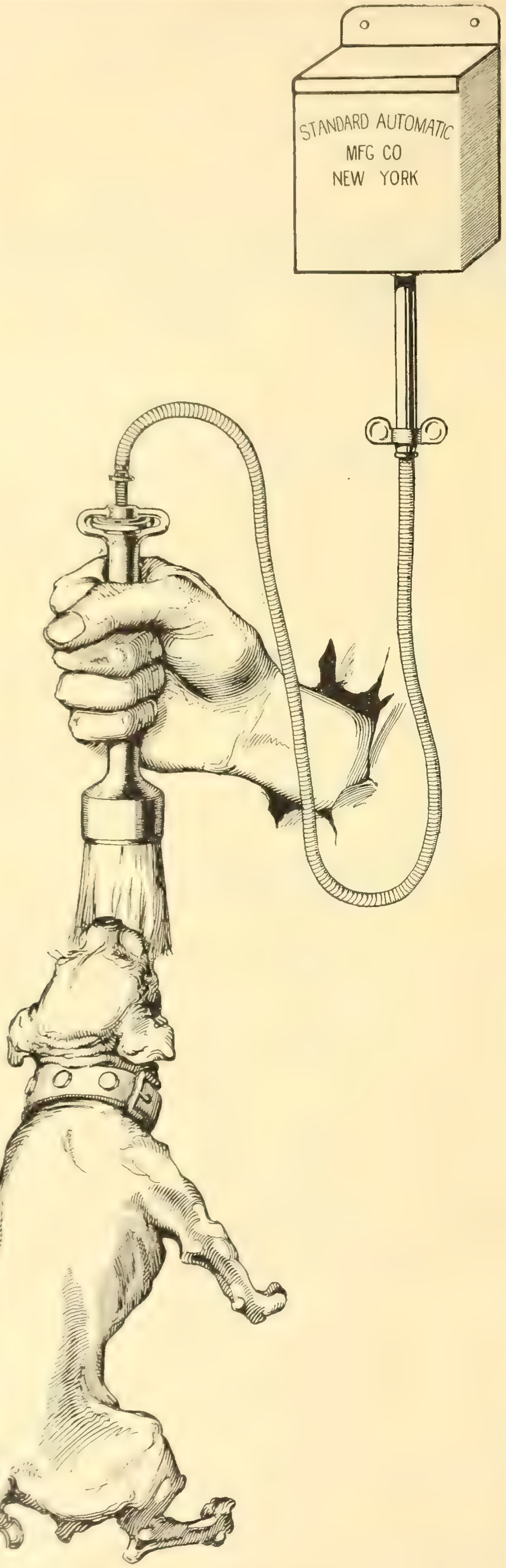

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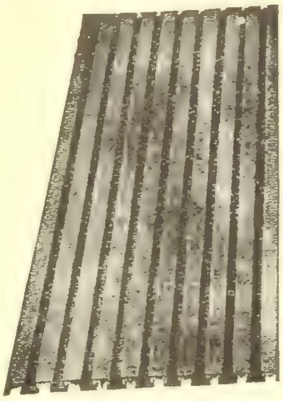

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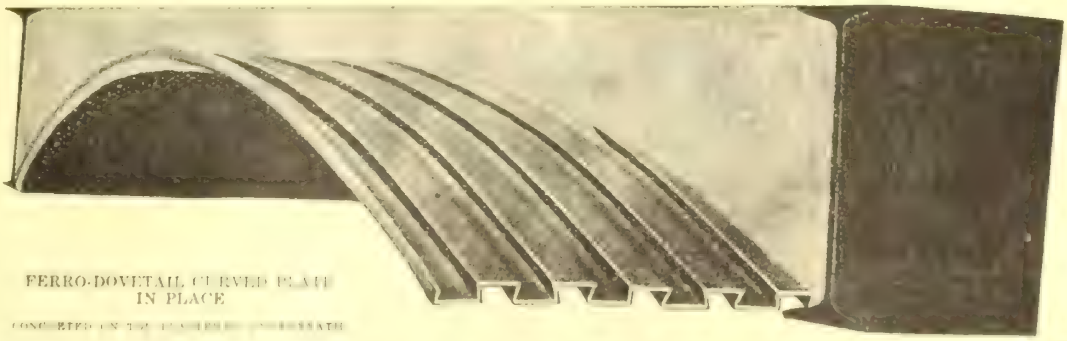

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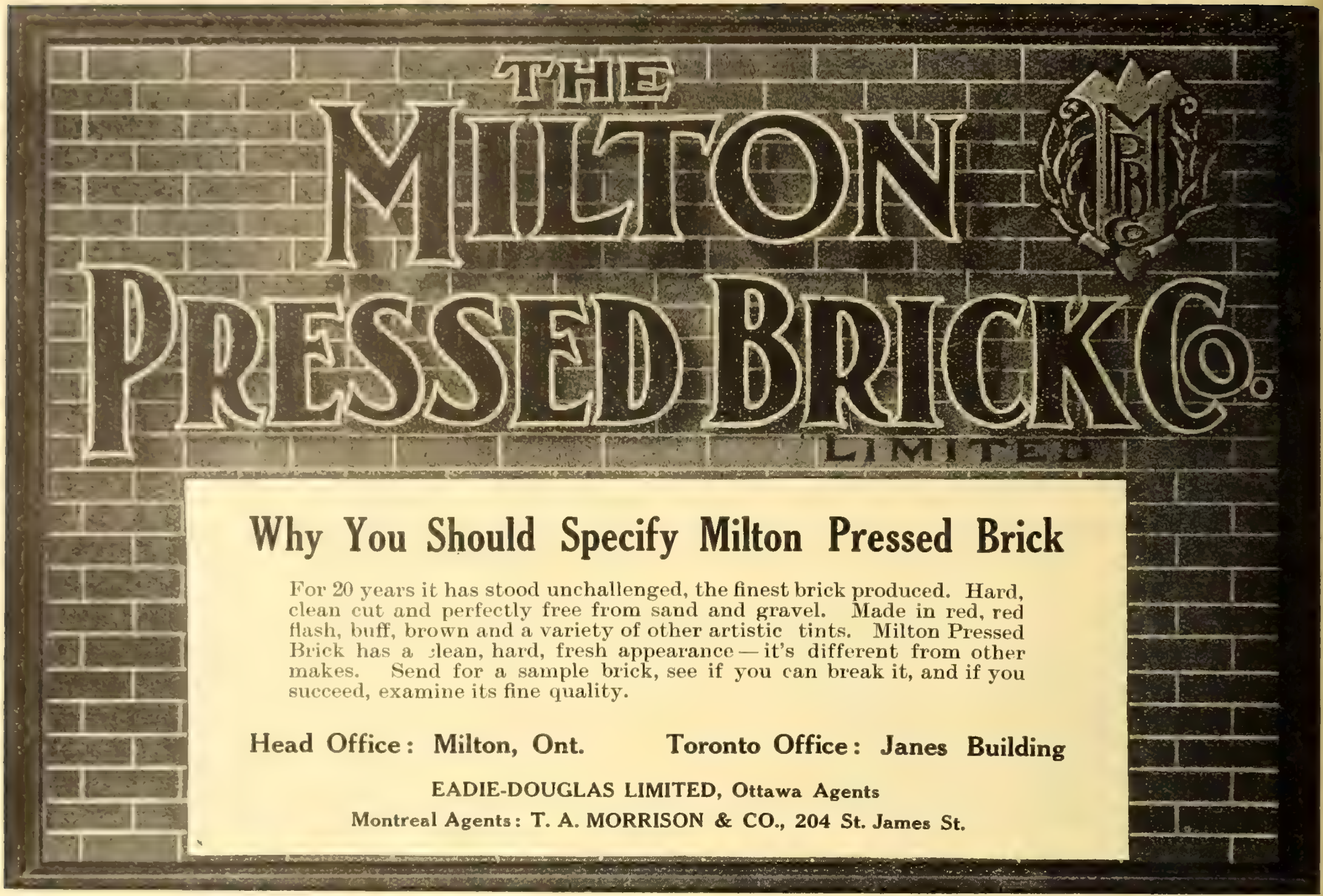

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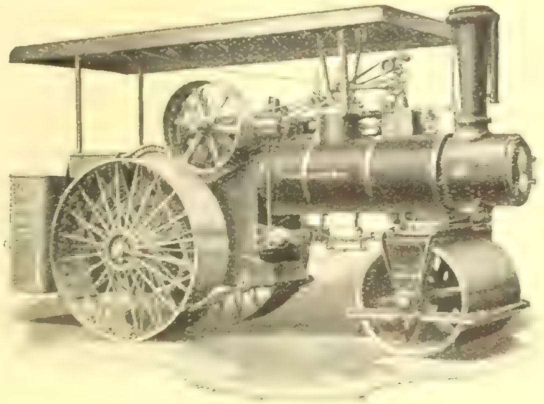

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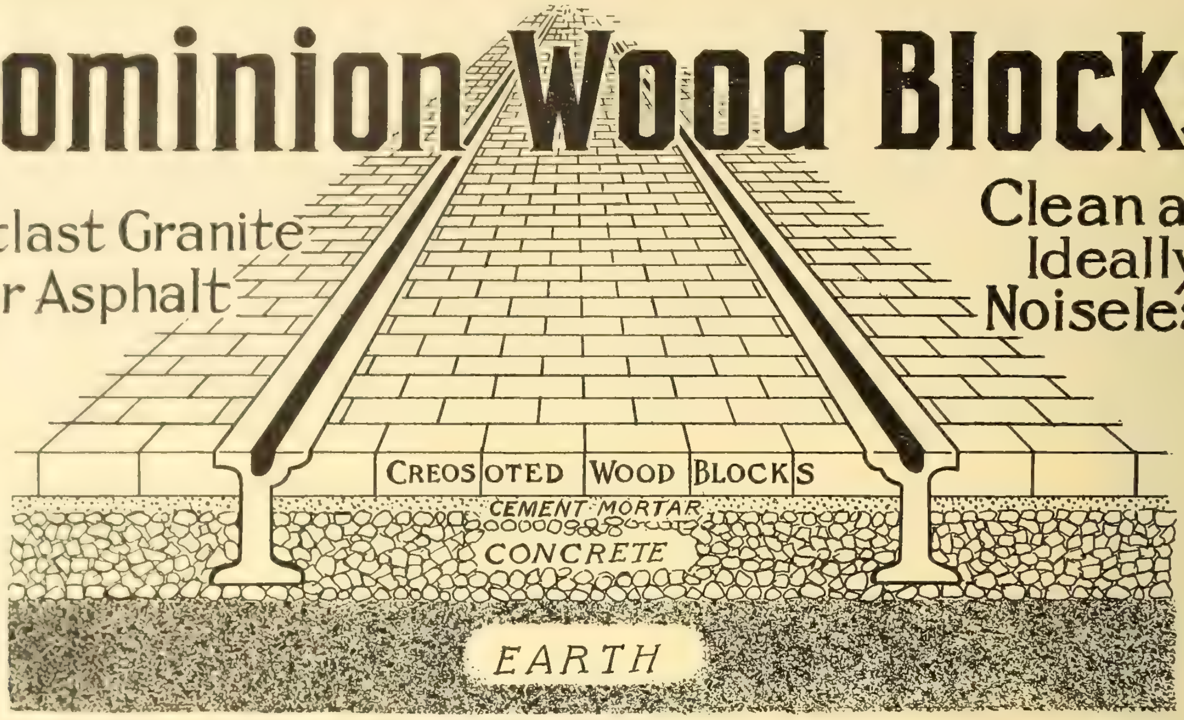

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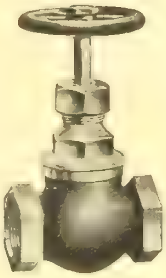

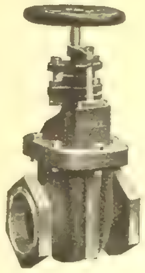

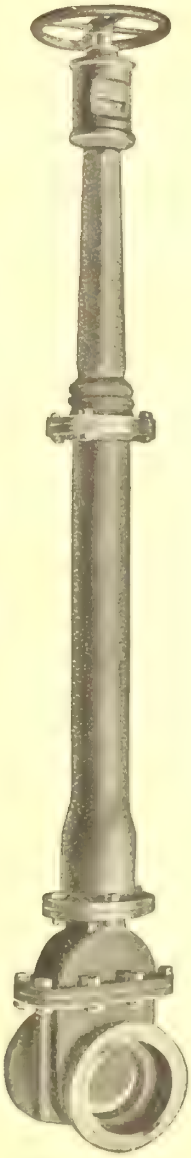

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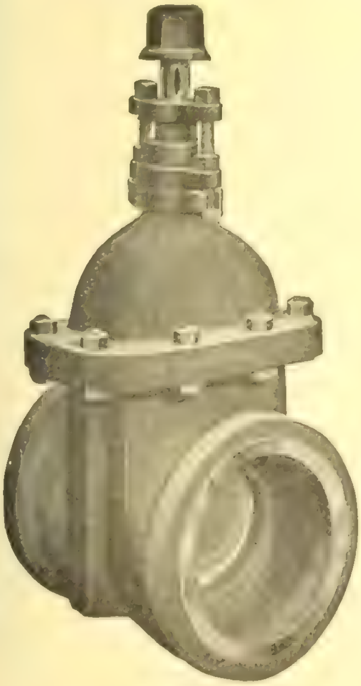

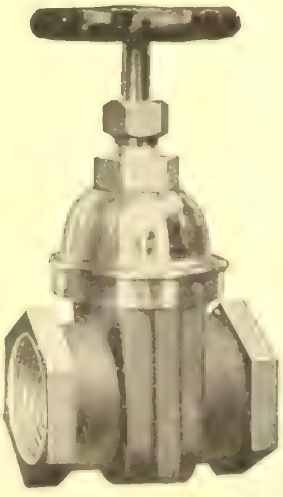

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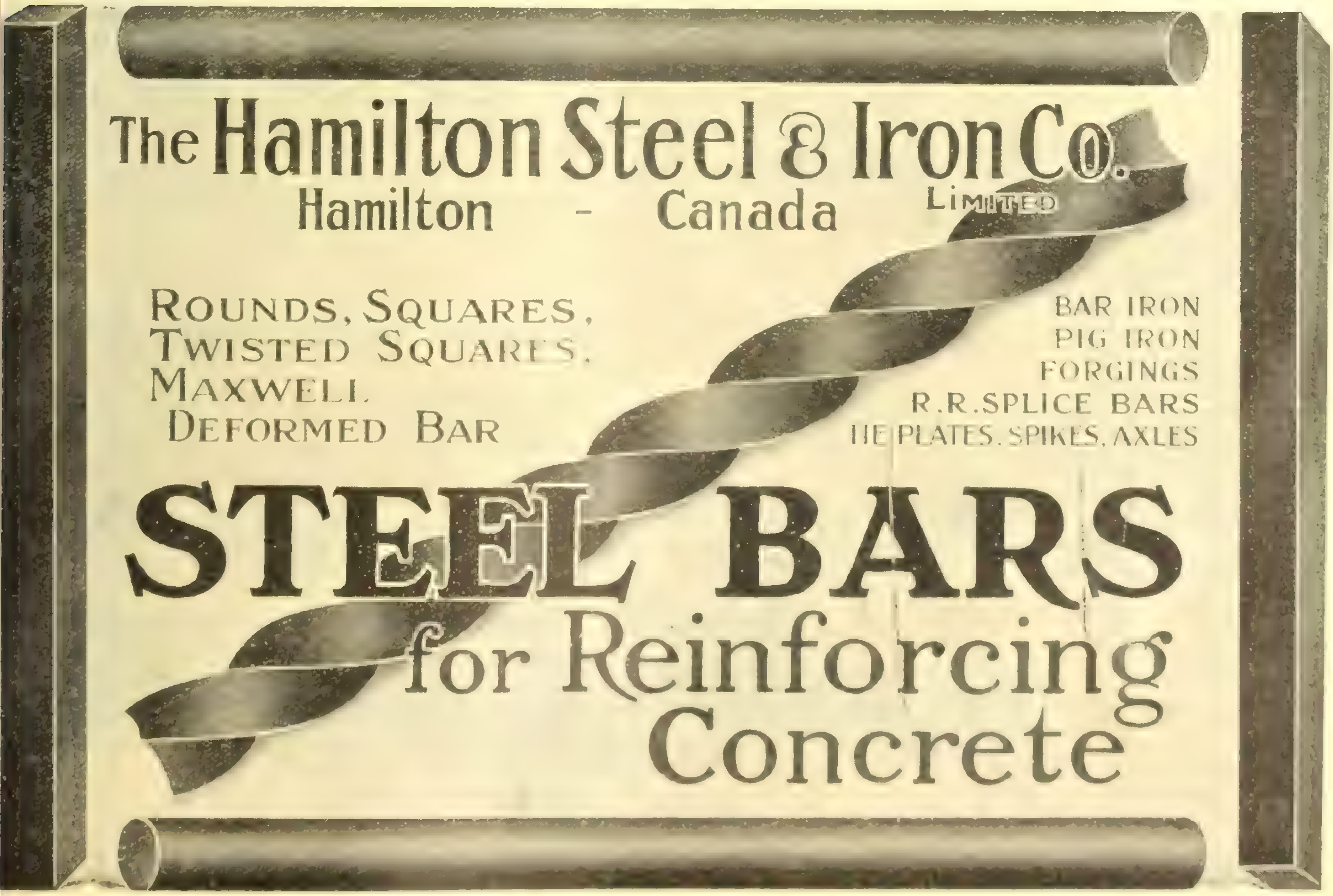
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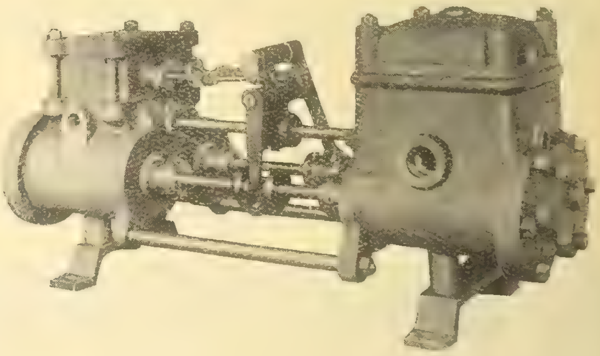

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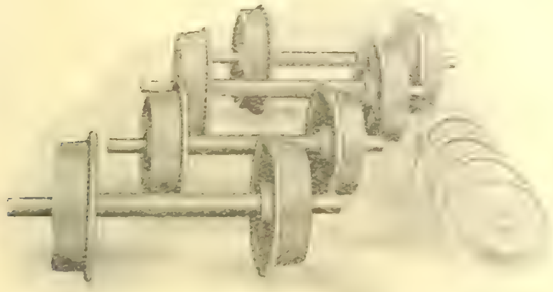

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0 u. i.	5.00	4.75	10.00	7.50
0 u. i.	5.25	5.25	11.50	8.50
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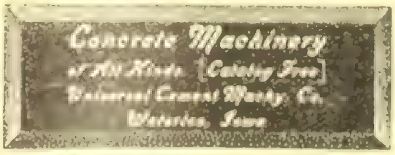

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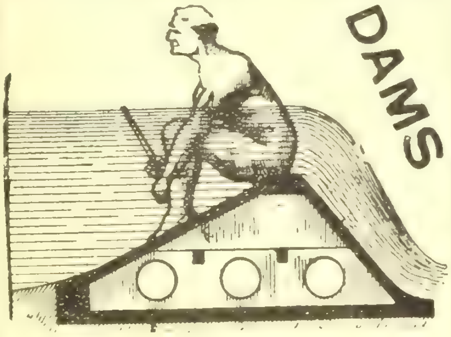

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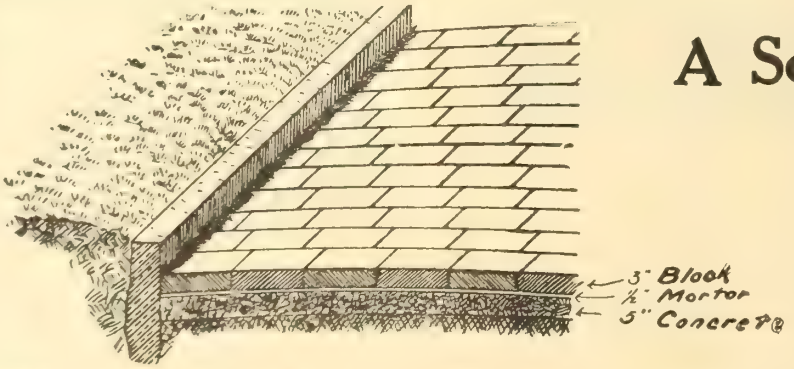

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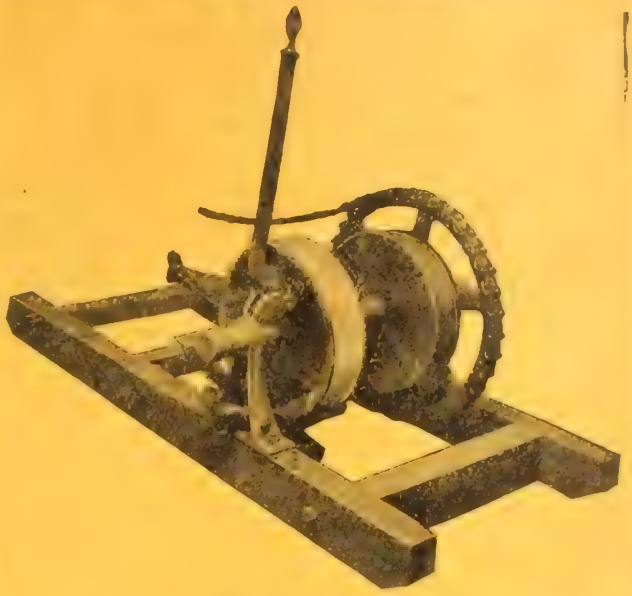

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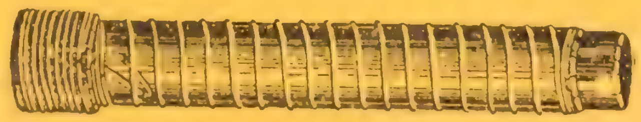

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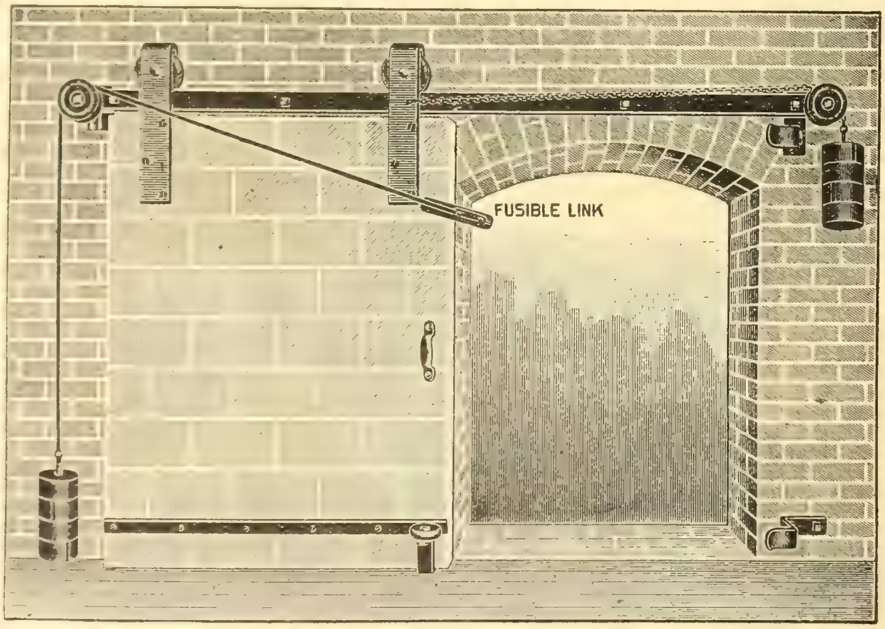

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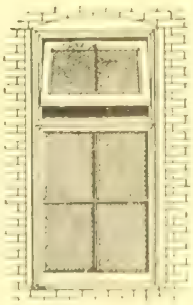

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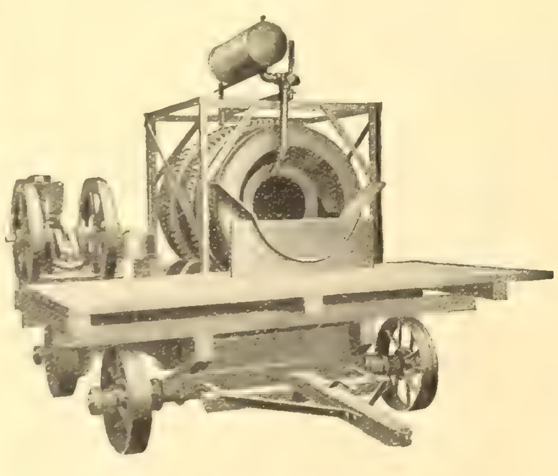

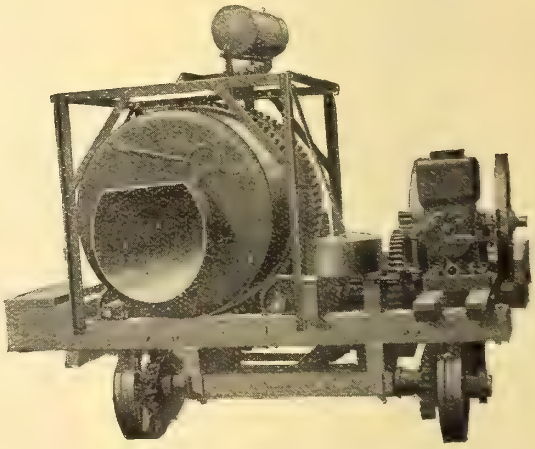

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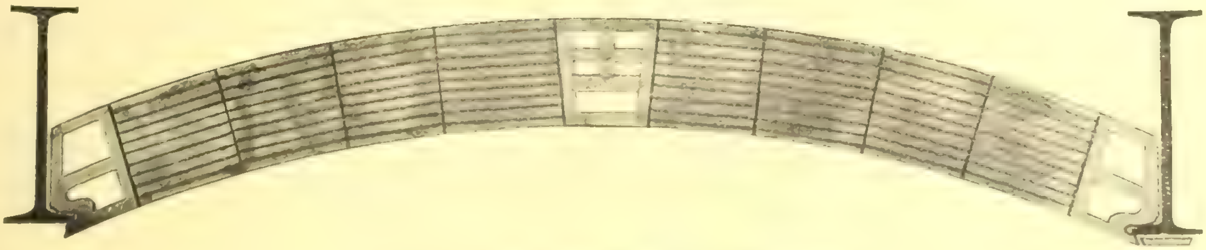

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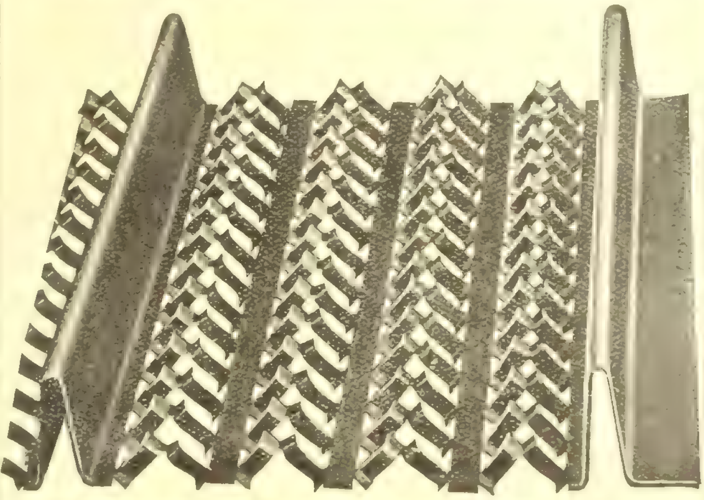

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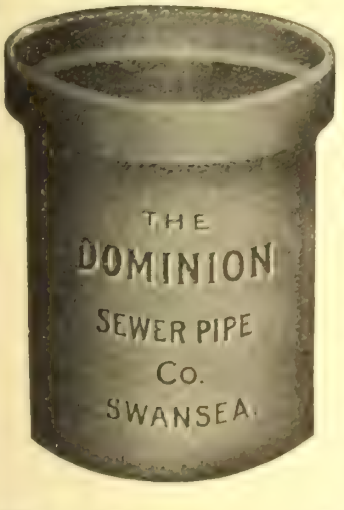

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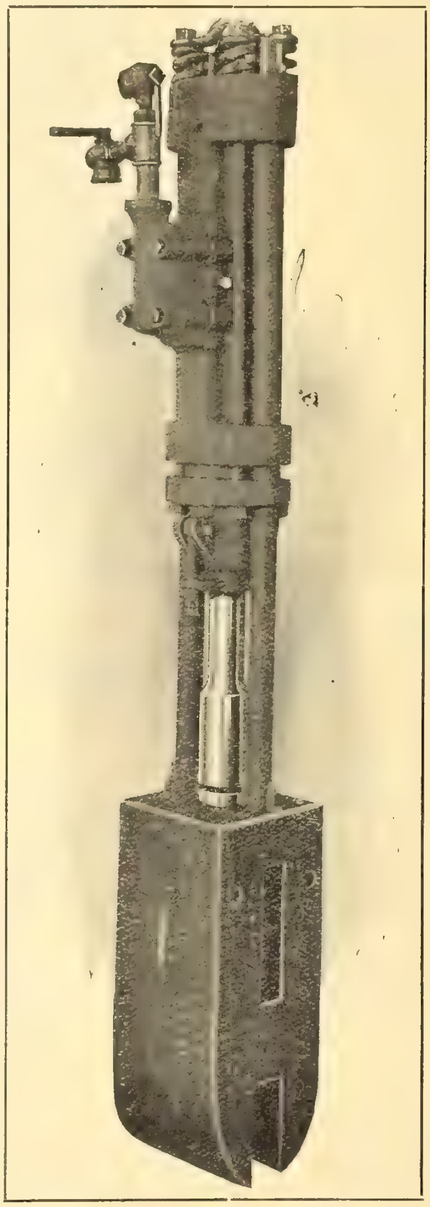

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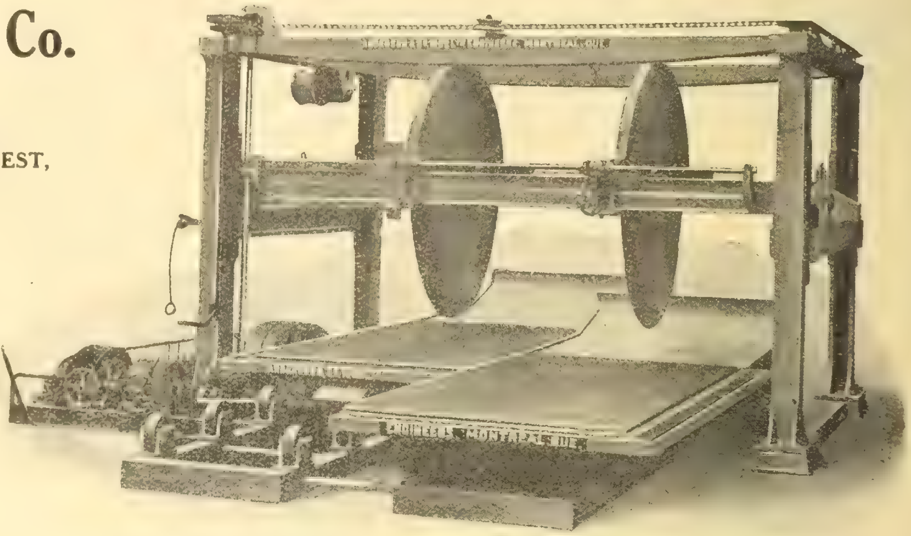

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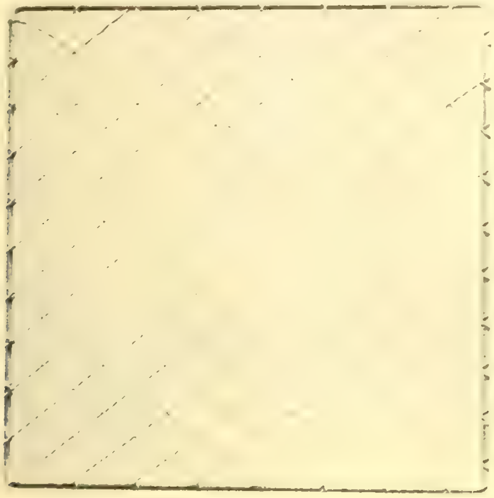

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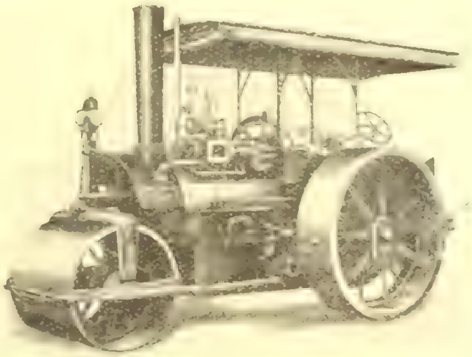

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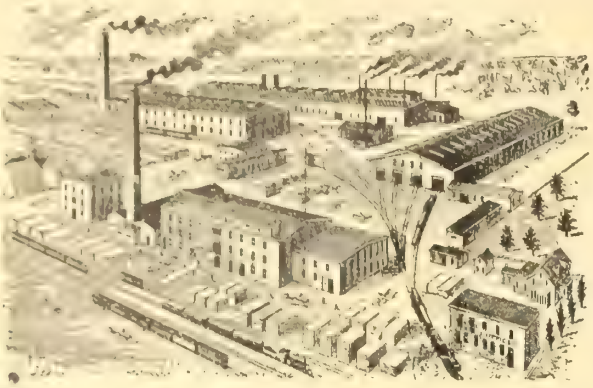

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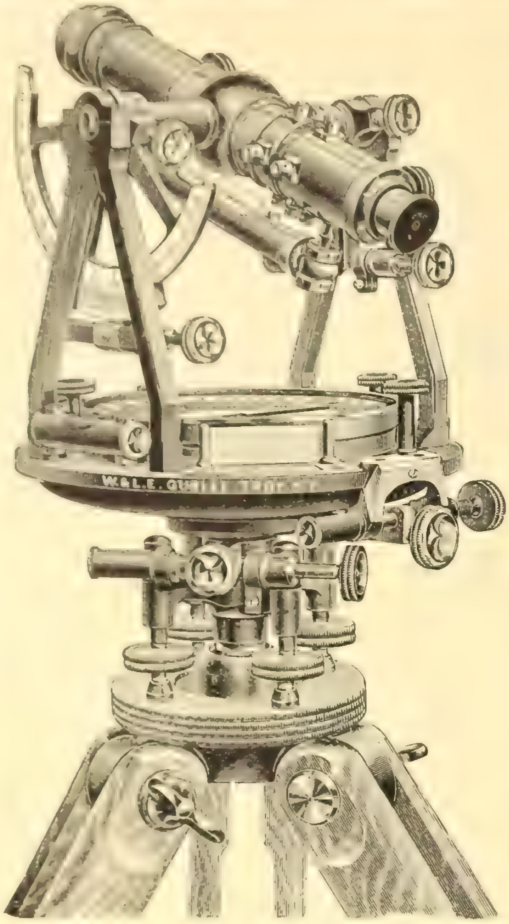

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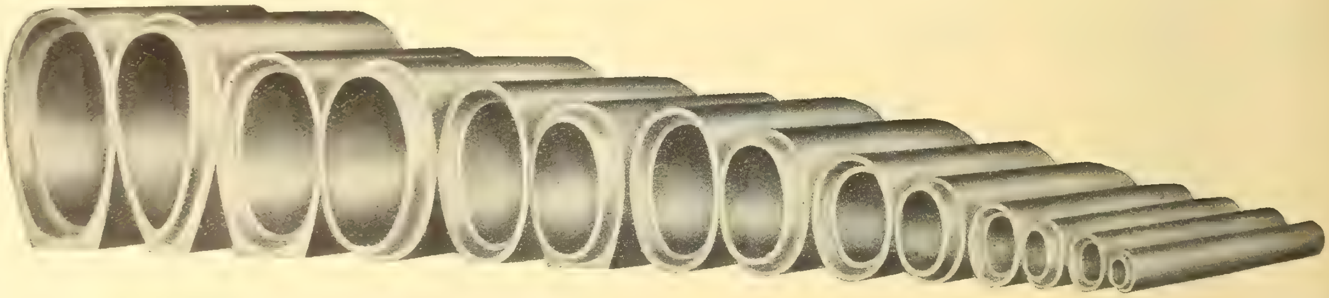

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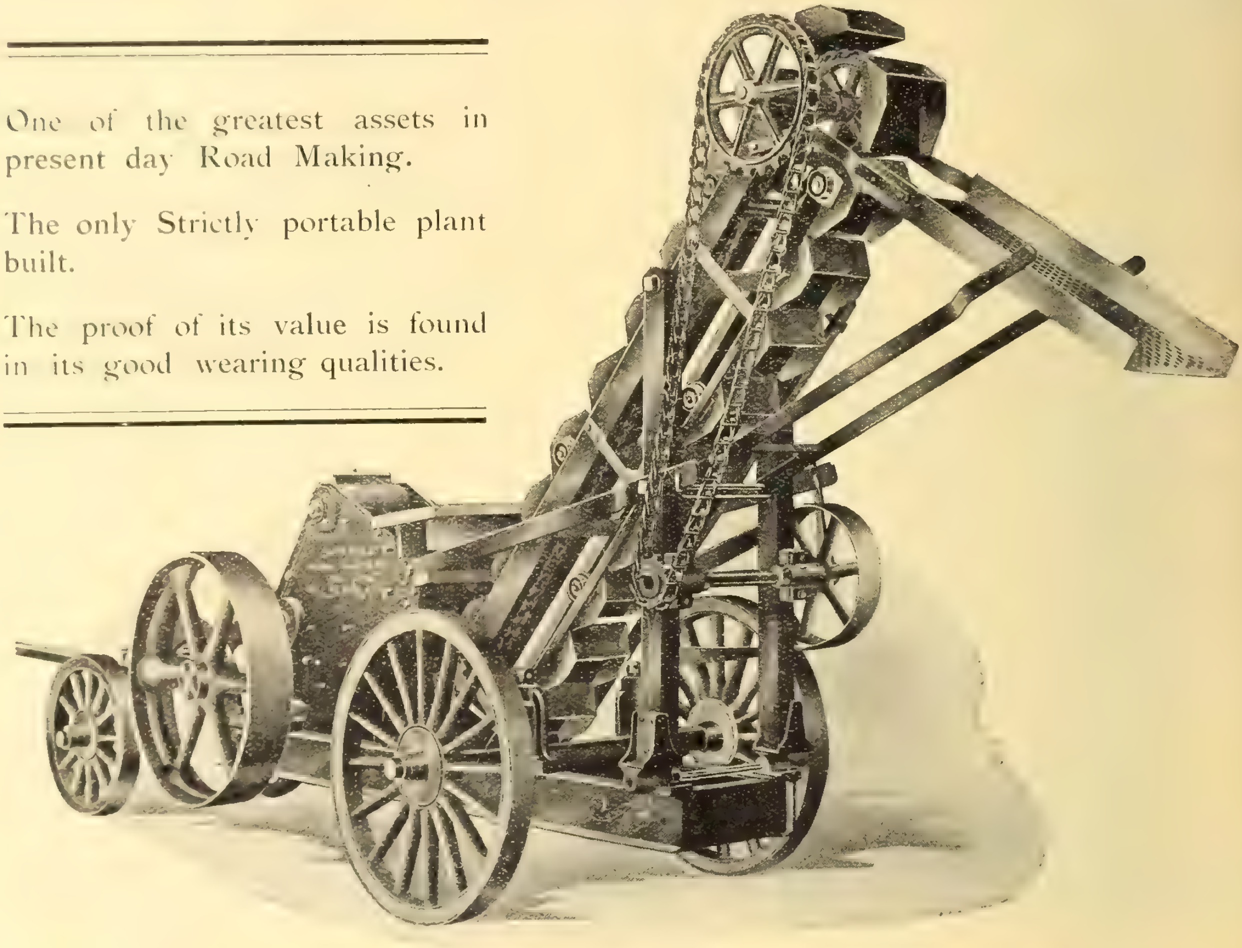

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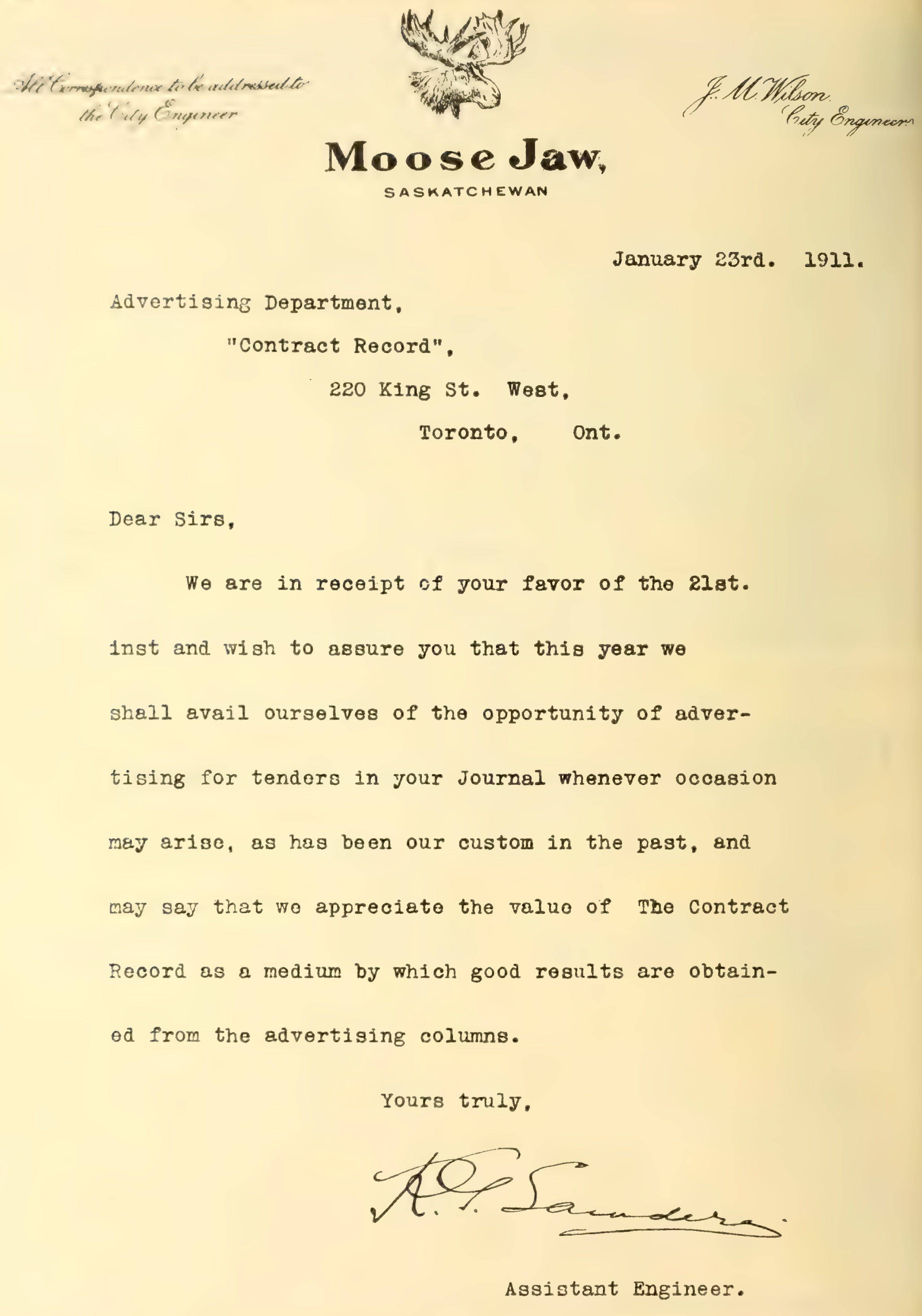

All Correspondence to be addressed to
the City Engineer

J. M. Wilson
City Engineer

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January 23rd. 1911.

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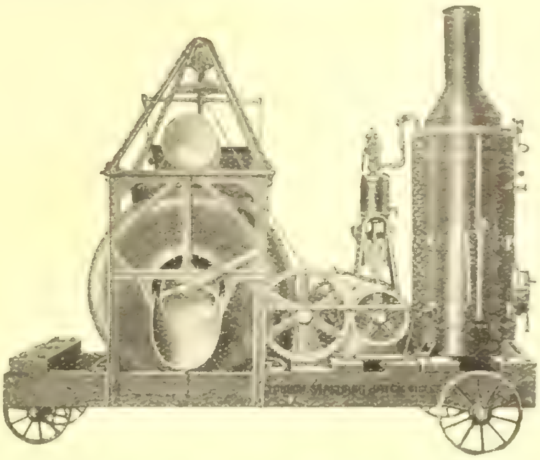

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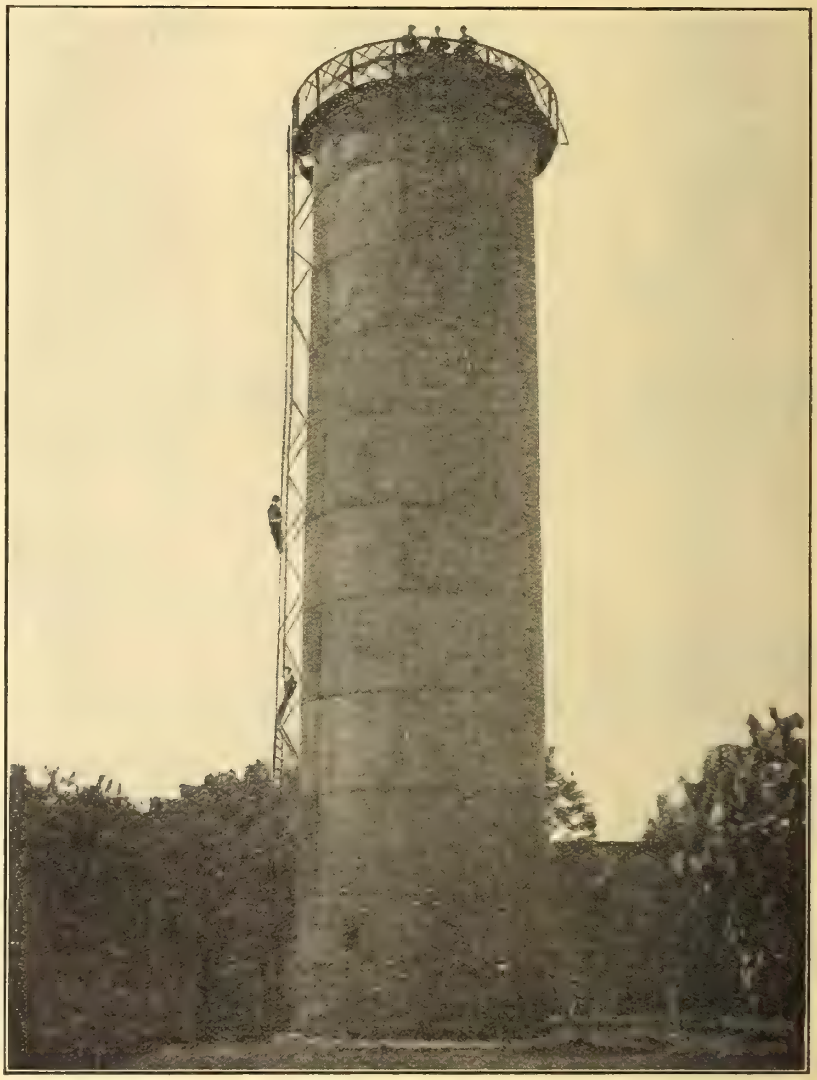

Water Tower at Whitby, Ont.

The John Inglis Company Limited

ENGINEERS AND BOILERMAKERS

14 Strachan Avenue - TORONTO, CANADA

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Belleville, Ont.

Tenders will be received until February 25th for excavation of 9-in. drain on Campbell street from Y. M. C. A. to Front st. sewer.' Specifications at Y. M. C. A.

Brantford, Ont.

Tenders are called by the Board of Works until March 2nd for supply of sewer pipe for year 1911. T. Harry Jones, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Calgary, Alta.

Tenders addressed to W. D. Spence, city clerk, will be received until March 15th for construction of concrete walks. Specifications at office of city engineer.

By-laws will be submitted to the ratepayers for approval shortly to authorize the expenditure of $245,000 on waterworks extensions; $40,000 on sewer connections; street paving plant (previously mentioned). By-laws are also being prepared for a large trunk sewer and for lateral extensions, to cost about $500,000. A. G. Graves, city commissioner.

The city is now constructing a miniature gravity system that will cost $8,000. This new system is the one that will supply water to the new power plant on the Elbow, near the street car barns. A head of about 8 feet of water will thus be obtained. Eighteen inch wooden pipes will be used, excepting where the pipes cross the river, when iron is used. There is 3,500 feet of piping. A supply of between 4 and 5 million gallons will be obtained in a 24 hour day.

Carleton Place, Ont.

A public meeting has been called to discuss the proposition of installing a waterworks system.

Edmonton, Alta.

Tenders will be received by city commissioners here until March 1st for supply of lead pipe, galvanized iron pipe and brass goods. Specifications at waterworks department.

Hamilton, Ont.

Tenders addressed to G. H. Lees, chairman of Board of Control, will be received until March 9th for construction of sewers, etc. S. H. Kent, city clerk. Advertisements in "Tenders and For Sale Department" of this issue.

Kingston, Ont.

Kingston will build all its roadways under the local improvement law..

London, Ont.

Tenders addressed to chairman No. 2 committee were received until February 20th for construction of sewer on Windsor ave., involving 810 lineal feet 8-in. tile sewer; 1,254 lineal feet 6-in. side drains; 3 brick manholes. A. H. VanCleve, city engineer.

Montreal, Que.

The mayor and city clerk have been empowered to enter into a contract with the firm of Messrs. Herring, Fuller & Monahan, New York, who will draw plans for the work to be done. These plans are to be ready for the early part of the coming spring, so that the city will be in a position to call for tenders for the construction of the plant. All operations in connection will be carried out under the direction of George Janin, city engineer. The plans will provide for a low lift pumping equipment, preliminary filters and final filters. In addition to this, there will be special reservoirs for the filtered water, whilst all appurtenances, including pipes conveying water to and through the present closed conduit and terminating in a new suction well for the high lift pumping apparatus, are provided for.

North Toronto, Ont.

North Toronto ratepayers passed a resolution favoring the construction of a sewerage system from the plans prepared by Engineer T. Aird Murray, the cost to be levied by a general tax.

Oshawa, Ont.

At a meeting of the council the town engineer was authorized to advertise for tenders for asphalt blocking of centre of town roadway.

Tenders are called until March 18th for construction of an asphalt block pavement on a concrete base, etc. Advertisement in "Tenders and For Sale Department" of this issue. Frank Chappell, town engineer.

Ottawa, Ont.

Mr. N. Cauchon is preparing plans for a sedimentation basin for Ottawa's water supply from Lake Deschene, which will be laid before the board of trade at its next meeting.

Pembroke, Ont.

Tenders called for laying 5,900 feet 16-in. force waterworks main from near pump house to connect with present system opened 13th, bids as follows: Emile Michel, Pembroke, $4,300; Edward Behan, Pembroke, $6,765; Feineyhough & Banand, Pembroke, $10,492; G. Crowe & Son, Trenton, $5,989; R. Brewder, Ottawa, $4,452; J. F. Connolly, Toronto, $5,800. A. J. Fortier, clerk.

The following list of tenders received for intake pipe and force main will be of interest:

Geo. Crowe & Son, Trenton, Ont., intake, $9,812; force, $5,989; total, $15,801. Accepted.

Emil Michel, Pembroke, force, $4,300. Accepted.

J. F. Connolly, Toronto, intake, $12,400; force, $5,800; total, $18,200.

R. Browder, Ottawa, intake, $13,000; force, $4,452; total, $17,452.

E. Behan, Pembroke, intake, $13,650; force, $6,765; total, $19,615.

Rutherford Cumming, Toronto, intake, $14,490.

Leslie Construction Co., Toronto, intake, $17,690.

Ferneyhough & Barnes, Pembroke, force, $10,b92. John L. Armour, resident engineer; T. Aird Murray, Toronto, consulting engineer.

Penticton, B.C.

Contracts will be let shortly in connection with waterworks which will involve an expenditure of about $130,000. F. H. Latimer, construction engineer. F. E. Tiley, city clerk.

Peterborough, Ont.

The tenders for machinery for pumping station are as follows: Canadian Fairbanks Co., vertical gasoline engine and compressor, belted, $4,170; Canadian Fairbanks Co., gasoline engine and compressor, combined, one machine, $1,290; Vandeleur & Nicholls, vertical gasoline engine, geared to Reavell compressor, $1,557; Canadian Rand Co., vertical Fairbanks horizontal compressor, Peerless chain drive, $9.75; Vandeleur & Nicholls, 10 h.p. motor Reavell compressor, $1,350; Canadian Rand Co., 10 h.p. horizontal compressor, Peerless chair drive, $1,246; Lancashire Dynamo and Motor Co., 10 h.p. motor, geared to Sentinel vertical compressor, $1,092. City Engineer Hay; consulting engineer, W. E. Chipman.

Ridgeway, Ont.

Tenders addressed to M. S. Pound, clerk, will be received until March 1st for construction of proposed drain in the vicinity of Crystal Beach, Tp. of Bertie; said drain to be 2,700 feet long, 42-in. in diameter at intake, increasinf 42-in. in diameter at intake, increasing out. Plans at office of above.

Souris, Man.

Tenders addressed to J. W. Breakey, sec.-treas., will be received until May 1st for waterworks debentures to the amount of $95,000.

Tenders addressed to V. H. Williams, town engineer, will be received until March 20th for excavation, laying and back filling for about 31,000 feet of standard vitrified sewer pipe and all necessary tees, wyes, etc.; excavation, laying and back filling for about 31,500 feet of standard c.i. water pipe and all necessary tees, reducers; excavation, setting and back filling for 70 standard fire hydrants; construction of about 75 manholes and setting covers and frames for same; the construction of a brick building 60 ft. x 40 ft. x 14 ft. on concrete foundation, together with all necessary machinery, consisting of compression tanks, gasoline engines and pumps. Plans, etc., at office of the above. J. W. Breakey, secretary-treasurer.

Toronto, Ont.

Tenders addressed to Chairman Board of Control, will be received until February 28th for supply of 20-in. c.i. pipe.

Specifications at office of city engineer.

Tenders addressed to G. R. Geary, chairman of board of control, will be received until March 14th for the following: 3,400 lin. ft. of 60-in. reinforced concrete pipe; 9,728 lin. ft. of 66-in. reinforced concrete pipe. Plans, etc., obtained from Main Drainage Department, City Hall. Advertisement in "Tenders and For Sale Department" of this issue.

Vancouver, B.C.

The time for receiving tenders for supply of brass goods and galvanized iron pipe has been extended until February 27th. Wm. McQueen, city clerk.

Tenders addressed to Wm. McQueen, city clerk, will be received until March 22nd for supply of water pipe, fire hydrants, valves and pig lead for this city. Specifications at waterworks department, city hall.

Tenders for the supply of a road roller were received as follows: P. E. Harris & Co., $3,200 and $3,610; Waterous Engine Works, $3,470; Canada-Ford Company, $2,545; Beach Manufacturing Company, $3,290, $3,395, $3,820, and $2,950; Mussons, Ltd., $3,150 and $4,275. The Buffalo Steam Roller Company and W. C. Winterburn also tendered, but failed to enclose cheques.

Alderman Enright urged that in view of the fact that several outside districts were being brought into the city, the board should take steps to buy an additional roller to the one now tendered on. He also thought it would be advisable to buy a steam shovel. This and the above tenders referred to city engineer, acting chairman, Crowe, anad Alderman Enright.

Victoria, B.C.

Tenders for clearing View street were as follows: B. W. Smith, $2,350; A. O. Roy, $2,500; Murray & McKinney, $2,190.

Tenders are called by Public Works Department until February 24th for dredging for road and drainage ditch in Maple Ridge.

Tenders for the construction of about 400,000 square yards of pavement will be received until March 3rd. Specifications at office of City Engineer, A. Smith; W. W. Northcott, purchasing agent.

The development of Sooke Lake as a source of supply for Victoria was authorized at a special meeting of the council. The city, according to a statement contained in a report by Mr. Raymur, water commissioner, has until March 15 next to start work on the expropriation of the properties required.

The plans for the parapet which is to be included in the Dallas road seawall will be referred to the Victoria Architects' Association for an expression of opinion as to their ornamental excellence before the Pacific Coast Construction Co. is instructed to proceed with the work.

AWARDED

Fort William, Ont.

The following tenders for supply of 30,000 pig lead were received: Lumby Stenhouse, Fort William, $1,197; W. S. Piper, Fort William, $1,164; Anderson & Co., Fort William, $1,150; Northern Engineering Supply Co., Fort William, $1,155; Plumbing & Engineering Supply Co., Fort William, $1,130 (accepted). John Wilson, city engineer.

Montreal, Que.

Tenders were awarded for the supply of Paving blocks and chainstone. For the former the Laurentian Granite Co., Ltd., being the lowest tenderers, were awarded the contract. The total quantity called for in this instance was 25,000 square yards and the company's figure was $1.48 per yard; Standard and Laurentian block, 9-inch blocks, to be supplied at $85 per 1,000, and 6-inch at $70. The proportion of each size required by the city will be determined as the permanent works are being carried out. For chainstone the lowest offer for straight stone was from Hubald Crevier, at 41 cents per linear foot. He secured the contract for 150,000 feet. For curved stone Messrs. Dixon and Mandeville, at 52 cents per foot, received the award for 2,000 feet.

Ottawa, Ont.

Tenders for over a quarter of a million dollars worth o fsupplies were dealt fith by the board of waterworks committee.

The tenders accepted by the committee were: Cast iron pipes, A. W. Fleck, representing the Canada Iron Company, Limited, $11,583.40; special pipe castings, the Canada Iron Company, Limited, $2.70 per cwt.; hydrants, Chaudiere Machine Company, $38.50 each; oils and grease, Capital Warehouse Company, $390.50; valves, Chaudiere Machine Company, $1,148.15; lead pipe, McKinley and Northwood, $1,801.10; brass, Robert Mitchell and company, Montreal, $1,915.50. The tenders accepted and those to be further considered by the board of control are:

Brick, Peerless Brick Company, $8.20 per thousand, being the lowest.

Vitrified clay pipe, Canadian Agency and Supply Company, 64 per cent. off catalogue price; McNally and Company, 61 per cent off catalogue price.

These are the two lowest tenders; the city engineer will report as to the quality, the lowest being for Swansea pipe, manufactured for Scotch pipe.

Broken stone, West End Construction Company, the lowest.

Sand, Foster and Irwin, the lowest, at 94 cents per cubic yard.

Cement, T. S. Kirby and Company, and Wright and Company, each 53c per cwt.; Ottawa Fireproof Company, Canadian Portland cement, 52 cents. The city engineer will report on the quality of the Canadian Portland.

Hardware, assorted goods, W. G. Charleson, being the lowest.

Nepean sand stones, Canadian Quarries Company, $53 per thousand and $53 per track blocks.

Castings, Thos. Lawson and Sons, $3.25 per cwt.

Asphalt, Barker Asphalt Company, $27.80 per ton; Elder Albano Asphalt Company, $27.10. The city engineer will have an analysis made to determine which is the better.

Lumber, McAuliffe, Davis and Company, assorted prices, the lowest.

Toronto, Ont.

Board of Control has awarded tenders for the lowe level interceptor as follows:

The Godson Contracting Co., of Toronto, $13.10 per lin. foot.

City Engineer, $18.30 per lin. foot.

C. H. Rust, City Engineer; A. C. D. Blanchard, assistant engineer, main drainage works.

Vancouver, B.C.

The following firms tendered for supply of steam road roller: Western Engine Co. (Aveling & Porter), Vancouver, B.C., $3,290, free; (Mussens Ltd. (Ruston Proctor Ltd.), Vancouver, B.C., $3,150, free; Mussens Ltd. (Austin Mfg. Co. motor), Vancouver, B.C., $4,275, free; Beach Mfg. Co. (Monarch), Portland, Ore., $3,965, duty; H. B. Gilmour (Waterous), Vancouver, B.C.; $3,470, free (accepted); P. E. Harris & Co. (Aveling & Porter), Vancouver, B.C., $3,200, free; Canada Ford Co. (Forster), Montreal, $2,700, free; Buffalo Steam Roller Co., Buffalo, N.Y., $2,600 (Buffalo); B. C. Winterburn (Fowler), Victoria, B.C., $3,500, free. W. A. Clement, city engineer.

Victoria, B.C.

Tenders for the year's supply of brick were received from Baker Bros. and the Victoria Brick and Tile Company, both for $12.75 per thousand. Last year's price was $12. Each concern will be given half the order.

Railroads, Bridges and Wharves

Belleville, Ont.

The railway commission has approved the plans of the Canadian Pacific for their proposed line from Toronto to eastern Ontario, through Whitby, Oshawa, Bowmanville and Cobourg to Belleville, and constrrction is promised to be undertaken shortly. The present plans of the company call for a line running directly through the towns mentioned to Belleville, thence turning northward to Bathurst, about ten miles west of Smith's Falls, where the main line will be reached.

Quebec, Que.

The time for receiving tenders for construction of about 56 miles of the Quebec & Saguenay Railway has been extended until March 10th. J. F. Guay, civil engineer, Quebec.

Fredericton, N.B.

Tenders for Maces Bay sea wall are called until February 27th by Public Works Department here. Plans, etc., at the Public Works Department, Fredericton, N.B.; at the office of Hon. W. C. H. Grimmer, Surveyor-General, St. Stephen, John Morrissy, chief commissioner.

Fort William, Ont.

The by-law to authorize the construction of a bridge suitable for vehicular and elecctric railroad traffic across the Kaministiquia river was carried.

Kingston, Ont.

The bill to incorporate the Ottawa and Smith's Falls and Kingston Railway Company, was approved by the railway committee of the legislature, but was not reported finally, as it had not been properly drafted. The company asked for a charter allowing them to run an electric road, develop electric power and to dispose of the surplus.

A civic deputation composed of Ald. R. F. Elliott and John Carson will wait upon the Minister of Militia in reference to the question of constructing a new bridge across the lower portion of Kingston harbor to the Pittsburg shore. The Department of Militia is interested as access to military grounds, etc., is gained through this bridge.

Lanark, Ont.

Tenders for construction of wooden bridge over the Clyde will be received until March 4th. J. Boyd Caldwell, chairman roads and bridges committee.

London, Ont.

It is announced that all wooden bridges between Toronto and Windsor on the C. P. R. will be replaced by steel and concrete.

County Engineer Charles Talbot is preparing plans for between 40 and 50 bridges, ranging in length from 10 to 200 feet, which are to be erected on the roads throughout the county this summer. All the bridges are either steel or concrete. The bridge over the Thames at what is known as the Giles site, will not be erected until next year, as the contract will not be let until December.

Le Petit Debarquement, Que.

Tenders addressed to R. C. Desdochers, secretary, Department of Public Works, Ottawa, will be received until March 8th for construction of wharf here.

Montreal, Que.

Construction of the Canada & Gulf Terminal Railway from Matane to Gaspe, it is stated, will be commenced in the spring.

Port Arthur, Ont.

It is stated that a pleasure pier will be constructed here. J. W. Gates is interested.

Port Stanley, Ont.

H. J. Lamb, London, is reported to be preparing plans for breakwater here, 1,200 feet. Noted in issue of February 8.

Quebec, Que.

The following tenders were received for St. Charles bridge: Mr. F. X. McGigan, $183,00 and $185,000; Mr. Lemone, Montreal, $155,200, $156,200 and $155,000; J. G. Gignac Cie., $202,000 and $217,000. The tenders were referred to Mr. Valle, engineer of the public works department, who will report to council.

Renfrew, Ont.

The tenders received for piles for construction of new Horton bridge were not accepted, the price being too high.

Richibucto, N.B.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until March 15th for construction of extension to north breakwater here. Plans at this department, at the offices of E. T. P. Shewen, Esq., district engineer, St. John, N.B.; Geoffrey Stead, Esq., district engineer, Chatham, N.B., and on application to local postmaster.

Swan River, Man.

Tenders addressed to Joseph Armstrong, secretary-treasurer, municipal council, will be received until April 15th for supply of one 94-ft. centre to centre of end bearings steel-rivetted Pratt truss bridge with (steel) stringers, and in. tamarac plank floor for steel bridge over Woody river. Specifications at Department of Public Works, Winnipeg.

Tracey Station, N.B.

Tenders are called by Department of Public Works, Fredericton, until March 6th, for construction of concrete substructure and approaches of bridge over Oromocto river, etc. Plans, etc., at the Public Works Department, Fredericton, N.B., at the store of Ernest A. Tracey, Esq., Tracey Station, John Morrisy, chief commissioner.

Vancouver, B.C.

Survey parties will be despatched north next spring to locate the line of the British Columbia & Alaska Railway between Fort George and a point in Southeastern Alaska. The route from Lytton and St. George has already been located. L. M. Rice, C.E., of Seattle, is in charge.

Victoria, B.C.

Need of having the plans for the sea wall on Dallas road revised before further work is done on same has been demonstrated by the effect of the recent gales. The opinion of the engineers supervising the work is that the base of the new wall should be at least four feet deeper than the present plans call for, so as to get a depth below low tide.

AWARDED

Merritt, B.C.

It is understood that Macdonell, Gzowski & Co., of Vancouver, have secured the contract for the second thirty-mile section of the Kettle Valley Railway.

Red Deer, Alta.

The contract for concrete foundation of high level bridge over Red Deer river on Alberta Central Railway, has been awarded to Jackson & Goldie, Winnipeg. J. Grant McGregor, chief engineer.

Public Buildings, Churches Schools, etc.

Barrie, Ont.

The plans for the proposed new Armory show a building 70 x 160 feet, pressed brick with stone trimmings, two stories. The drill hall, 70 x 120, will have ten foot brick wall and trussel iron roof. Estimated cost, $15,000.

Bassano, Alta.

Tenders addressed to H. Buckingham, secretary Bassano, S.D., will be received until March 4th for construction of 4-room brick school. Tenders will be received in bulk without the heating and ventilating system separate. Plans, etc., at office of architect W. T. Williams, Medicine Hat, or from the above-mentioned.

Calgary, Alta.

It is understood that an appropriation of $75,000 was made to build a new land and irrigation department building here.

Under date of last information the contracts for erection of St. John's church had not been awarded. Estimated cost, $12,000. Materials, brick (veneer). Messrs. Lang and Major, architects.

By-laws to expend $75,000 on fire station, and $120,000 on two incinerators, will be voted on shortly. A new isolation hospital and municipal store house are being considered. A. G. Graves, city commissioner.

Chippawa, Ont.

Plans are being prepared for a new 4-room school here. Architect Borter, Welland.

Carleton Place, Ont.

Tenders addressed to Geo. Gardiner, secretary building committee, will be received until March 18th for construction of new St. John's church, at Boyds, seven miles from here. Plans, etc., at office of Mr. J. S. L. McNeely, barrister, this place.

Castleford, Ont.

Tenders for enlarging school No. 3 Horton, addressed to A. Johnson, jr., will be received until March 1st. Plans, etc., at office of the secretary, W. J. Humphries.

Cookshire, Que.

Tenders are called until March 1st for construction of school in district No. 1, parish of St. Isidore d'Auckland. Plans, etc., at office of Rev. Nap. Favreau, Sawyerville.

Dundas, Ont.

Tenders were called until February 17th for masonry, carpentry, galvanized iron work, heating and plumbing, electric wiring and drainage in connection with House of Refuge near here. S. McPhie, Hamilton, architect; J. W. Jardine, county clerk.

Edmonton, Alta.

The question of a Children's Shelter will be considered by public works committee.

A by-law authorizing the purchase of a site for city hall will be submitted, after which plans for the new building will be considered.

Tenders will be called for $100,000 stock pavilion to be erected by Edmonton Exhibition Association as soon as the plan is chosen from the competitive ones submitted.

The Nurses' Home, in connection with the Royal Alexandria Hospital here, will be erected as soon as definite plans have been determined. Meyer J. Sturn, Chicago, is acting as consulting architect. Estimated cost of building, $4,000.

Galt, Ont.

There will shortly be an active campaign for the provision of larger quarters for the Y. M. C. A., of which Mr. A. R. Goldie is president.

Halifax, N.S.

The preliminary plans for the mining and metallurgical laboratory in connection with the Nova Scotia Technical College have been approved and call for a building 110 feet in length by 70 feet, of brick with granite trimmings. Prof. E. A. Holbrook is in charge of the design and construction. Work is expected to start in April and finish in August.

Harriston, Ont.

Tenders addressed to R. C. Desrochers, Secretary, Department of Public Works, Ottawa, will be received until March 13th for construction of public building here. Plans, etc., at office of H. J. Lamb, district engineer, at the local post office, and at Ottawa.

Kingston, Ont.

The post office at Kingston Junction owned by Alexander Campbell, has been destroyed by fire. Loss, about $5,000.

La Tuque, Que.

The proposition of erecting a hospital here this spring is being considered. Rev. Father Corbell is interested.

London, Ont.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until February 27th for addition to military stores building here. Plans on application to Mr. H. J. Lamb, district engineer, and at the above department.

Melville, Sask.
The Lutheran Church for Western Canada have decided that the Lutheran College shall be situated here

Midland, Ont.
Tenders for sale and removal of the buildings purchased by the Public School Board are called until March 1st. C. D. Tuleman, secretary.

Montreal, Que.
The building inspector and fire chief Tremblay are to report on the location of a fire hall on St. Hubert street.

New Westminster, B.C.
The plans for the new University School will be ready in about a week, it is stated. They call for an immediate expenditure of about $100,000, and later on of about $500,000. Capt. H. J. R. Cullin is interested.

Oak River, Man.
Tenders are called until March 29 for issue of $7,000 debentures for the purpose of building a municipal hall. G. McIntyre, secretary-treasurer.

Orillia, Ont.
The General Hospital Board have under consideration the enlargement of the hospital.

Ottawa, Ont.
An 8-room addition will be buitl to the Mutchmor street school, to cost not more than $65,000.

The First Congregational Church will call for plans shortly for the erection of their new church on the corner of Florence and Kent streets.

Tenders addressed to J. Albert Ewart, 103 Sparks street, will be received until February 27th for erection of new Bethany Presbyterian Church.

Prince Rupert, B.C.
Application has been made to the government for a site for a new school in west end which will be required in the near future.

Port Simpson, B.C.
Tenders are invited until February 28th for erection of large one-room school here.

Regina, Sask.
A by-law for the installation of fire hall equipment to cost $7,500 will be submitted shortly; also one to provide for the granting of $15,000 to the Y. W. C. A. for erection of a new building.

Toronto, Ont.
Permit was granted to Toronto General Hospital for 2-storey brick and steel power house and laundry on Elizabeth and Hayter streets, $55,000; also for Nurses' Home on College street, $250,000.

Vancouver, B.C.
C. P. Jones, Vancouver, is the architect for erection of stock-judging pavilion for the Exhibition Association. Estimated cost, $30,000. Thirteen plans were presented. Tenders will be called at once.

The cost of rebuilding Mountain Valley Methodist Church recently destroyed by fire, is estimated at $22,000.

Victoria, B.C.
Tenders addressed to Wm. W. Northcott, superintendent public buildings, will be received until February 24th for erection of two fire halls. Information obtained from the above-mentioned.

In the provincial estimates, $150,000 has been voted for immediate enlargement of the legislative wing of provincial buildings; $16,500 for repairs, etc., at Government House.

Winnipeg, Mna.
It is stated that the erection of post office will be started this year. $10,000 has been appropriated by government.

The Elmwood Presbyterian Church congregation have decided on the corner of Johnson avenue and Bird's Hill road as the site for their new church.

Battleford, Sask.
Tenders addressed to R. Rogers, Minister of Public Works, will be received until February 28th for erection of administration building for Agrcultural College, St. Nobert. Plans, etc., at office of Provincial Architect Hooper.

The congregation of Dufferin Avenue Presbyterian Church are about to start a building campaign fund for a mission church to be erected on the site recently purchased at the corner of McKenzie street and Burrows avenue. Mr. Edward Brown is interested.

AWARDED

Calgary, Alta.
Doyle & Thomas, of Lethbridge, have the contract for the school near Colonel Walker's residence, at $95,000; Peers & Macleod the contract for the Hillhurst school, at $98,000.

Chilliwack, B.C.
The contract for the building of the new city hall has been let to J. C. Robertson, of this city. Estimated cost about $17,000.

Saskatoon, Sask.
It is stated that the tender of Smith Bros. and Wilson, of Regina, for building the first part of new Emmanuel College, has been accepted.

Residences

Brandon, Man.
Tenders were called until February 20th for erection of manse for St. Paul's Presbyterian Church. Plans, etc., at office of Shillinglaw & Marshall, Archiitects.

Calgary, Alta.
Tenders were called until February 20th for erection of residence for Lieut.-Col. Jas. Walker at East Calgary. Messrs. Lang & Major, architects. Tenders were called in October for excavation and concrete work.

Edmonton, Alta.
Building permits have been issued as follows: Johnson and Maxter, First st., rooming house, $4,000; A. Rendall, 3 two-storey frame dwellings, Peace avenue, each, $3,200.

London, Ont.
Tenders will be received until February 25th for erection of brick residence on King street. H. C. McBride, architect.

Vancouver, B.C.
Preliminary plans have been prepared for the construction of an eight-storey apartment building on Melville street, at a cost of approximately $225,000. The building, which will measure 66 by 132 feet, is to be erected by Mr. J. Seabolde, and construction will be commenced early in the spring.

The following building permits have been issued recently: Beard Home Building Company, dwelling, 1916 Eleventh avenue west, $4,000; Beard Home Building Company, dwelling, 1735 Eleventh avenue west, $4,000; F. L. Dixon, two dwellings, 1624 Graveley, $3,500; Shaw Bros., dwelling, 1126 Eleventh avenue west, $4,200; R. E. Piper, store and dwelling, 2847 Manitoba street, $3,000.

Winnipeg, Man.
Tenders addressed to F. R. Evans, 506 Somerset Building, will be received until February 22nd for erection of brick and stone residence for J. M. Aikins, Esq.

Business Buildings and Industrial Plants

Carleton Place, Ont.
The plans for the new Union Bank block have been received and cail for a two-storey structure, of brick, with Roman stone front.

Edmundston, N.B.
The Felix Hebert Hotel, of which Mr. J. M. Sirois is proprietor, was destroyed by fire on the 14th inst. Estimated loss, $10,000.

Edmonton, Alta.
It is understood that the property lately occupied by C. P. R. offices on Jasper avenue, recently sold to Capt. Robinson, will be used as a bank site for the Northern Crown Bank. Lane & Scarth effected the sale. The C. P. R. have purchased the McLeod block, which they will have remodelled until the erection of their block.

Farnham, Que.
The building owned by Mr. A. Saurette, contractor, was destroyed by fire on the 15th inst. Estimated loss, $18,000.

Kingston, Ont.
North American Smelting Company is about to erect a lead smelter here to treat the ore that comes from their mines in Loughboro Township, in Frontenac County.

Maniwaki, Que.
It is announced that Messrs. Ayers & Hamelin, Montreal, are negotiating with this municipality towards locating here. Mr. D. Cavanagh, mayor.

Merritt, B.C.
A large gypsum plant will be located at Spatsum on the main line of the C. P. R. The refining plant, it is stated, will be constructed on the shores of Burrard Inlet near Port Moody. Those interested are George Hinton, of the Hinton Eleceric Co., 606 Granville st., J. J. Banfield, E. W. McLean, and E. A. Choate, of Vancouver.

Montreal, Que.
Damage was done to the wholesale grocery warehouse of D. C. Brosseau and Company, Notre Dame street to the extent of about $50,000.

New Westminster, B.C.
Mr. Abraham Goldberg, of the Vancouver Junk Works, it is stated, has purchased a site from the Western Steel

Corporation with 200 feet of water frontage. Work will be commenced immediately on construction.

Ottawa, Ont.

Mr. R. Gordon Stewart has purchased the First Congregationl Church, on the site of which he will erect a fine office building this summer Messrs. Larmonth & Walsh effected the sale.

Perth, Ont.

This municipality will vote on a by-law shortly to assist a carpet manufactory which is seeking a location in eastern Ontario. Robert Dodds, of Guelph, is interested.

Peterborough, Ont.

The Canadian General Electric Company are considering the construction of a lamp factory here to cost about $250,000. Gen. manager, Mr. Nichols; assistant general manager, J. J. Ashworth.

Port Mann, B.C.

Mill No. 1 of the Canadian Western Lumber Company was destroyed by fire on the 10th inst. Loss estimated at about $10,000.

Regina, Sask.

Permits were issued to Saskatchewan Hotel Company, a two-storey addition to the King's Hotel on Scarth street, $40,000; the Toronto Type Foundry, for a warehouse at a cost of $18,000.

Rosthern, Sask.

Mr. H. A. McEwan intends erecting a building 30 x 70 feet. Plans are now being prepared.

Sherbrooke, Que.

Tenders are wanted until February 28th for erection of barn, 40 x 50 feet. Alex. Ames & Sons, 279 Wellington st.

St. Boniface, Man.

Mr. G. M. Ellis has secured option on 30 acres of land east of the Seine river as a site for an automobile factory which he is planning to establish here. Estimated cost, $1,250,000.

The Manitoba Rolling Mills Company are planning for the enlargement of their business this spring, erecting the necessary plant for steel work on their present site with an equipment of at least four furnaces and two trains of rolls.

St. John, N.B.

Messrs. Scovil Bros., Ltd., will erect on the property adjoining their present store a modern 5-storey building, with provision for additional stories.

Toronto, Ont.

Plans for the expansion of C. P. R. interests are before the board of control for consideration.

A large office building for the Dominion Express Company will be erected on the Government House site. King and Simcoe streets, while a portion of the grounds will be laid out as a park. A viaduct will be built across the north end of the city, and a large station put up near Yonge street north. A new union station will be erected whether the viaduct proposition goes through or not. Several new freight yards will be established in outlying portions of the city. This, with the new office building previously mentioned, will bring the expenditure to about $5,000,000.

Vancouver, B.C.

Provision for three more storeys has been made in connection with the hotel being erected for Sam Kee, corner of Main and Harris streets. Contractor, R. P. Foreshaw; estimated cost, $100,000.

Tenders are called until February 24th for erection of 250-foot extension to C. P. R. freight shed; also extension to C. P. R. station at New Westminster. H. Rindal, division engineer, C. P. R., Vancouver.

Among the building permits issued are British Columbia Telephone Company, covering the erection of new substation in Kitsilano, $44,000; another to Mr. C. A. Godson, covering alterations to his block on Hastings street near Carrall, $24,000.

It is stated that the British Columbia Steel Company will establish its plant at Port Mann and that its charter is practically assured. Estimated expenditure, $10,000,000. A. P. Gillies, Tacoma, Wash., is interested.

Victoria, B.C.

Plans have been drawn for a two-storey brick block to be built by Mr. Arthur E. Haynes on the south side of Fort street at a cost of about $25,000.

Windsor, Ont.

The ratepayers voted the granting of privileges to the following firms: Moloney Electric Company, St. Louis, and Canadian Winkley Co., Detroit, Mich. The former will build a $10,000 plant at once in the factory district, the latter has bought a site in the west end, where a factory will be erected this year.

Winnipeg, Man.

Nares Block, a 5-storey structure, collapsed, it is said, owing to adjacent building operations. Estimated loss, $100,000.

Sub-contracts for the erection of new Bank of Commerce will be let in the near future. Lyall Mitchell Company have the contract for excavation and foundations.

Tenders addressed to Frank Lee, division engineer, will be received until March 1st for construction of frame buildings on the Manitoba division. Plans, etc., at offices of the superintendents at Fort William, Kenora, Brandon and Souris.

Woodstock, Ont.

A by-law to loan the Ken Knitting Company $20,000 was carried. The company will build a $35,000 factory.

AWARDED

Vancouver, B.C.

The contract for steel work in connection with construction of B. C. Telephone Exchange, corner of Yew and Tenth avenue, has been awarded to Messrs. Ross & Howard, Vancouver. Estimated cost, about $43,000.

The contract has been let by W. A. Clark for the erection of an $80,000 block on Granville street.

The contract for block for Mr. A. A. Riley, of the Crown Investment Company is with Messrs. McLennan & McKenzie, this city.

Victoria, B.C.

A. H. Mitchell has the contract for erection of 2-storey business block for Mr. A. E. Haynes. Cost $13,000. Architects, Messrs. James & James.

Power Plants, Electricity and Telephones

Calgary, Alta.

The council have decided to submit a by-law for $50,000 for the purchase of the power site on the Elbow.

By-laws to expend $380,000 on electric light extensions, and $60,000 on conduit system, will be voted on shortly. A. G. Graves, city commissioner.

Tenders addressed to city commissioners will be received until March 22nd for supply of the following: one 1,500 turbo generator, set with condenser, etc., three 1,000 s.v.a. single phase transformer, 12,000 to 2,300 volts, with switching gear, etc.; one 100 k.w. exciter. W. D. Spence, city clerk.

Elstow, Sask.

Tenders were called until February 18th for construction of about 75 miles of telephone line, etc. H. Young, sec.-treasurer.

Hamilton, Ont.

Applications are being received until March 15th from electrical engineers for preparing estimates of cost, etc., for a municipal electric power and light system. S. H. Kent, city clerk. Advertisement in "Tenders and For Sale Department" of this issue.

The Dominion Power & Traction Co. propose adding to plant in 1911 as follows: At power house, a 6,400-k.w. a.c., 2,400-volt generator and 7,100-h.p. Voith turbine; at Hamilton a substation, 8,000-k.w. capacity, Westinghouse equipment, and at Brantford a substation, 3,000-k.w. capacity, Westinghouse equipment. W. C. Hawkins, general manager.

Medicine Hat, Alta.

Tenders addressed to A. K. Grimmer, city engineer, will be received until March 1st for construction of natural gas well. Advertisement in "Tenders and For Sale Department" of this issue.

Penticton, B.C.

This municipality has under consideration the establishment of a hydro-electric plant and lighting system to cost about $70,000. Contract will probably be let in two or three months. F. H. Latimer, consulting engineer.

Prince Albert, Sask.

Contracts will probably be let shortly for a 600 k.w. direct-connected unit (engine or turbine) at the municipal electric light plant; also preliminary work in connection with a 10,000 h.p. electric plant.

Regina, Sask.

A by-law providing for additions to the electric lighting plants at a cost of $100,000 will be submitted shortly. This provides for the installation of electric lighting additions, the street railway generating unit and equipment.

Saskatoon, Sask.

Additional machinery for municipal plant will be purchased. E. L. White, superintendent, has recommended improvements and extensions involving an expenditure of about $140,000.

Vancouver, B.C.

See "Business Buildings Awarded."

Plans are prepared for the increase of the equipment of the Vancouver Gas Co.

(Continued on page 33)

Tenders and For Sale Department

For Sale — Second Hand

No. 8 Austin Gyratory Crusher.
No. 6 and No. 3 Austin complete plant.
No. 3 Austin and 2 No. 6 Gates and No. 5 "B."
70-ton Vulcan Steam Shovel, 2-yard.
50-ton Bucyrus Steam Shovel, 1¾-yard.
Loco. Crane, with 1¼-yard Clam Shell.
Little Giant Traction Steam Shovel, 1¼ yard.
Hayward Orange Peel Buckets, 1 and 1¼-yd.
Concrete Mixers, Steam Rollers, Air and Steam Drills, Air Compressors, Locomotives, Dump Cars, etc.

All our goods we fully guarantee.
Send for our February Booklet.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

Town of Dauphin

Province of Manitoba

Tenders for Reinforced Concrete Highway Bridge

Sealed tenders addressed to the undersigned Town Clerk will be received up to 8 p.m. **Saturday, the 25th day of February, 1911,** for all labor and material necessary for the construction of two reinforced concrete highway bridges to be constructed in the Town of Dauphin.

Plans and specifications will not be sent out, but may be seen at the Town Clerk's office, Dauphin, Man., or at Provincial Public Works Department, Winnipeg, Man.

The lowest or any tender not necessarily accepted.

H. F. CALDWELL,
Mayor.
A. H. F. STELCK,
Chairman Public Works Committee.
J. W. JOHNSTON,
Town Clerk.
6-8

TENDERS WANTED

Sealed tenders addressed to Geo. H. Lees (Mayor), Chairman Board of Control, and sent by registered letter, plainly marked on the outside "Tender for Sewer," will be received by the undersigned up to **10** o'clock a.m., of **Thursday, March 9th, 1911,** for the construction of the following sewers:—

Belview ave., from Cannon st. to Primrose ave.
Carrick ave., from King to Main streets.
Dunsmure ave., from Fairholt road to Carrick av.
Kensington ave., from Barton to Cannon streets.
King st., from Lottridge st. to Garfield avenue.
Rosslyn ave., from Barton to Cannon streets.
Central ave., from Norway ave. to Prospect st.
Lorne ave., from Central to Cumberland aves.
Glendale ave., from Barton st. to end of Glendale avenue.
Blake st., from Maple to Cumberland aves.
Maple ave., from Springer ave. to Blake street.
Boylestone ave., from Barton st. to end of Boylestone ave.
Balmoral ave., from Cannon to Barton streets.
Grosvenor st., from Cannon to Barton streets.
Barton st., from Trolley st. to Robins avenue.

Plans and specifications and other information can be obtained at the office of the City Engineer.

The lowest or any tender not necessarily accepted.

S. H. KENT,
City Clerk.
[illegible] February 17th, 1911. 8-8

Tenders

Bulk tenders will be received by the undersigned until noon of **March 4th,** for the construction of new Y. M. C. A. building, Belleville, according to plans and specifications furnished by C. J. Gibson, architect, Toronto. Plans may be seen at the Y. M. C. A. rooms, Front street. The lowest or any tender not necessarily accepted.

7-8 J. L. HESS, Secretary.

Town of Oshawa

Asphalt Block Pavement

Sealed tenders will be received up to and including the **18th day of March, 1911,** for the construction of an Asphalt Block Pavement on a concrete base, together with cement concrete curb, gutter and widening of sidewalk where necessary upon the following streets:

King street, 1,750 lineal feet of width, varying from 30 to 40 feet.

Simcoe street, 1,650 lineal feet of width varying from 30 to 40 feet.

The part to be paved will include that portion of the road occupied by the track of the Oshawa Street Railway Company.

Plans may be seen and specifications obtained from the Town Engineer's Office, Town Hall, Oshawa.

The lowest or any tender not necessarily accepted.

W. E. N. SINCLAIR, B.A., LL.B.
Mayor.
FRANK CHAPPELL,
Town Engineer.
Oshawa, February 20, 1911. 8-8

Department of Railways and Canals

Dominion Canals

Notice to

Dealers in Cement

Sealed tenders, endorsed "Tender for Cement," will be received by the undersigned up to 16 o'clock on **Friday, the 24th February, 1911,** for the supply of some 200,000 barrels of cement, more or less, required for the construction and maintenance of the various canals of the Dominion and to be delivered in such quantities, at such places and at such times as may be directed.

Dealers in cement may tender for the total quantity required, or for such portions thereof as may suit their convenience.

Specifications, forms of tender and full information can be obtained from the Purchasing Agent of the Department of Railways and Canals, Ottawa, on and after this date.

The Derartment does not bind itself to accept the lowest or any tender.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, 8th February, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 8-8

City of Strathcona

(Alberta)

Tenders for

Engine, Boilers and Generators

Tenders addressed to David Ewing, Chief Engineer power house, Strathcona, Alta., for the above machinery, will be received until noon, Wednesday, March 1st, 1911. Specifications may be obtained upon application to the undersigned.

A. J. McLEAN,
City Engineer.
Strathcona, Alta., Jan. 16, 1911. 4-8

Tenders for

Cement Walks

and

Concrete Curb and Gutters

The Board of Works of the Town of Berlin will receive tenders addressed to A. H. Millar, Town Clerk, up to **March 2nd next,** for constructing cement walks, and concrete curb and gutters during the year **1911.** Specifications may be seen at the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

H. A. DIETRICH,
Chairman.
Berlin, Feb. 17, 1911. 8-9

TENDERS WANTED

The Quebec & Saguenay Railway

Tenders will be received up to **March 10th, 1911,** at 12 o'clock noon, by the undersigned, for the construction of about 56 miles of the above railway, from Cap Tourmente to Murray Bay Wharf, divided up into sections of ten miles.

A certified cheque amounting to $20,000 for each ten mile section tendered for must accompany each tender.

Forms of tender may be obtained and specifications and plans examined at the office of J. F. Guay, Civil Engineer, Morin Building, Quebec.

The right is reserved by the company to reject any or all tenders.

6-8 (Signed) J. F. GUAY.

City of Brantford

Tenders for

Sewer Pipe

Sealed tenders addressed to Ald. Chas. Hartman, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received until 12 o'clock noon on **Thursday, March 2nd, 1911,** for the supply of Sewer Pipe, required by the City of Brantford during 1911.

Specifications may be seen and instructions to bidders and forms of tender obtained on application to the City Engineer.

Each tender must be accompanied by a marked cheque, payable to the order of the City Treasurer for the amount called for in the form of tender.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Hall, Brantford, City Engineer.
February 14th, 1911. 8-8

Tenders for Bridge

Tenders will be received by the undersigned up to 6 o'clock p.m., **Saturday, the 4th day of March, 1911**, for the erection of a reinforced concrete bridge, single span over the Clyde River at a point about 3 miles north of Lanark Village.

Bridge about 70 feet long.

Plans may be seen at the office of the undersigned at Lanark, or tenderers may submit their own plans and specifications.

Deposit of ten per cent. to accompany each tender, which will be returned if tender not accepted.

The lowest or any tender not necessarily accepted.

Dated this 2nd day of February, 1911.

J. BOYD CALDWELL,
Chairman of Roads and Bridges Com.
Lanark, Ont. 6-9

For Sale

One second-hand No. 1 Smith Concrete Mixer with engine and boiler complete.

One second-hand 7 x 12 Hoisting Engine, 3 drum d.c. and boiler complete, nearly new.

One 5-ton derrick with cables and sheaves.

One ¾-yard Clam Shell Bucket, nearly new.

Apply to
A. J. CROMER,
Brantford, Ont.
7-8

Medicine Hat, Alberta

Tenders for

Natural Gas Well

Sealed tenders will be received at the office of the City Engineer, City Hall, Medicine Hat, Alberta, until (12) o'clock noon on the **First day of March, 1911**, for the construction of a Natural Gas Well.

Specifications and all other necessary information can be obtained on application from the City Engineer. The lowest, or any tender not necessarily accepted.

A. K. GRIMMER,
City Engineer.
Medicine Hat, Alta.,
February 15th, 1911 8-8

Supply of

Reinforced Concrete Pipe

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon of **Tuesday, March 14th, 1911**, for the following:

3,400 linear feet of 60-inch Reinforced Concrete Pipe.

9,728 linear feet of 66-inch Reinforced Concrete Pipe.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Tenderers shall submit with their tender the names of two personal sureties, approved by the City Treasurer, or in lieu of said personal sureties the bond of a Guarantee Company, approved as aforesaid.

Plans and specifications may be seen and forms of tender obtained from the Main Drainage Department, at the office of the City Engineer, Toronto.

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with, or the tender will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.
City Hall, Toronto,
February 20th, 1911 8-8

TENDERS WANTED

Sealed tenders, addressed to Geo. H. Lees (Mayor), Chairman of the Board of Control, and sent by registered letter, and plainly marked on the outside "Tender for Sewers," will be received by the undersigned up to 10 o'clock a.m., of **Thursday, March 9th, 1911**, for the construction of the following sewers:—

Main street, from Albert street to Trolley street.
Maple ave., from Springer st. to Trolley street.
King street, from Garfield avenue to Spadina ave.
Barnesdale ave., from Dunsmure ave. to King st.
Highland ave., from Trolley st. to end of street.
Cannon street, from Trolley st. to Ottawa street.
Fairview ave., from King st. to Highland ave.
Barton st., from Lottridge st. to Trolley street.
Belview ave., from King st. to Cannon street.
Mars ave., from Wentworth st. to Douglas st.
Prospect st., from Main st. to Cumberland ave.
Lorne ave., from Maple ave. to Central avenue.
Fairview ave., from Highland ave. to Cannon st.

Plans and specifications and other information can be obtained at the office of the City Engineer.

The lowest or any tender not necessarily accepted.

S. H. KENT,
City Clerk.
Hamilton, February 16th, 1911. 8-8

Miscellaneous

Advertisements under this heading one cent a word per insertion. Box No. ten cents extra

AGENTS WANTED in all parts of Canada to handle a complete line of up-to-date steam water and air specialties. Box 225, Contract Record, Toronto, Ont. 8-8

WANTED—Salesman to sell a complete line of steam, water and air specialties as a side line. Address Box 226, Contract Record, Toronto, Ont. 8-8

AGENTS WANTED—Large American firm manufacturing a complete line of lineman't tools, and portable saw rigs for builders, contratcors and lumber yards wants Canadian representatives. For particulars apply, Box 221, Contract Record, Toronto, Ont. 8-9

Power Plants, Electricity and Telephones

(Continued from page 31)

The contract for steel is stated to have been given to Ashmore, Benson, Pease & Co., Stockton, Eng. Contracts for excavation and concrete work are still to be let.

Victoria, B.C.

Tenders for the installation of the cluster lighting system on Yates street between Government and Douglas sts. have been received by the city council from Hutcheson Bros. for $1,450 and the Electrical Construction Company for $1,400.

AWARDED

North Toronto, Ont.

Mr. W. A. Hansar, of Earlton, was awarded the contract by the lighting committee for supply of poles as follows: 400 30-ft. long; 100 35-ft. long, and 50 40-ft. long, at $3.20, $6.25, and $8.80, respectively.

Miscellaneous

Calgary, Alta.

Tenders addressed to W. D. Spence, city clerk, will be received until February 24th for purchase of [illegible]

Guelph, Ont.

The fire, light and markets committee have decided to recommend the purchase of 500 feet of new hose [illegible] globe suits, and a number of pairs of rubber boots.

New Dublin, Ont.

Tenders are called by J. B. Barry, township clerk, until March 6th for crushing 1,000 cords of stone in the township of Elizabethtown.

Ottawa, Ont.

Tenders addressed to chairman, board of control, will be received until March 14th for supply of combination automobile fire engine, pumping capacity, 700 to 800 gallons per minute. For further information apply to chief of the fire department, John Henderson, city clerk.

Tenders are called until February 24th for supply of some 200,000 bbls. of cement, etc., for construction, etc., of the various canals of the Dominion. Advertisement in "Tenders and For Sale Department" of this issue.

Toronto, Ont.

Recent building permits include: G. Philips, 3 att. 2½-storey brick dwellings on 113-5-7 Howland avenue, $7,500; T. Pennock, 3 att. 2-storey brick dwellings, Uxbridge avenue, $8,000; Ontario Jockey Club, 1-storey gal. iron betting shed. King E., $7,500; S. Lorie, alt. to factory, 208-210 Adelaide street west, $6,000; E. G. Switzer, 3 pr. semi-det. 2½-storey brick dwellings, Indian road, $14,000; W. H. Niddrie, 2-storey brick apartments, cor. Brunswick and Barton, $11,000; Geo. Hedderson, 5 pr. semi-det. 2-storey brick dwellings, Beach avenue, $20,000; Henry Matheson, 3-storey brick addition to apartments, 608 Ontario st., $6,600; H. Shinkman, 3 att. 2-storey brick dwellings, near antler, Campbell ave., $5,900; J. W. Walker, 2-storey brick apartments, cor. Bedford and Chicora, $12,000; S. G. Farrell, 3 att. 2-storey brick dwellings, east side Booth, $6,000; T. McLaughlin, 2-storey brick apartments, Irwin ave., $8,000; P. Wyatt, 3 det. 2-storey dwellings, brick fronts, Jones, $5,000; E. G. Lloyd Co., 2-storey brick factory, east side Carlaw, $8,000; A. W. Reid, 4 2-storey brick dwellings, Summerhill Gardens, $12,000; R. Larkin, 3 pr. semi-det. 2-storey r.c. dwellings, brick fronts, Jones avenue, $9,600.

Vancouver, B.C.

Permits were granted as follows: S. W. Hopper, 3516 Third avenue west, $3,000; C. F. Taylor, 1376 Thirteenth avenue west, $4,500.

Morrison & Dagnall, builders and plumbers' supplies, etc., Montreal; R. Morrison & Josiah Woodward Dagnall have registered.

The rumor is abroad of a C. P. R. line paralleling the G. T. R. to Toronto. Part of the big expenditure in Toronto is said to be called for on account of this. The new line will commence at Bathurst, ten miles west of Smith's Falls, and proceed southwesterly to Belleville. The whole of this line, it is said, will be double-tracked, and as the line between Smith's Falls and Montreal is double-tracked already, the C. P. R. will have a double track all the way between this city and Toronto, and an alternative route between Smith's Falls and Toronto and will reach all the important industrial communities between Montreal and Toronto now served by the Grand Trunk alone. Work will commence, it is said, in the spring.

Digging Ditches with Dynamite

By Arthur E. Morgan*

In the lowlands of southeast Missouri, a considerable amount of excavation for drainage ditches is now being made with dynamite, a method of construction discovered by accident in 1909. In blowing large stumps preparatory to digging drainage ditches, it was noticed that where several stumps close together in a line were blown out, a depression remained which had approximately the dimensions of the required ditch. Acting on the suggestion thus offered, efforts were made to blow out a channel by placing a single charge at a time, with results which were not satisfactory. Next charges were placed in the ground 2 feet apart for a distance of 100 or 200 feet, and an effort was made to discharge them at about the same time by means of fuses. As the explosion of all charges was practically instantaneous, it was apparent that all but the first had been discharged by concussion.

The experimenters continued setting charges 2 or 3 feet apart for distances up to a quarter of a mile, and found in all cases that it was necessary to set a fuse to only one of the charges, in order for the whole to be exploded. Up to the present this method is in use only for the construction of small ditches 3 or 4 feet deep and 6 to 12 feet wide. The dirt removed by the dynamite is thrown onto either side for 100 feet or more, and does not lie more than 6 inches or 1 foot deep along the margins of the ditch. The charges are set by making a hole of the necessary depth with a bar, and then pushing the dynamite into the hole with a wooden stick, tamping dirt on top. In order to secure a uniform cross section it is found necessary to place the charges at equal distances apart, and at such a depth that they will be on the proposed bottom line of the ditch, and that the charges should be approximately equal in size.

Master Builders' Convention at Winnipeg

At the fifth annual convention of the Canadian National Association of Builders, held last week in Winnipeg, the following officers were elected:

President, E. T. Nesbitt, Quebec (re-elected by acclamation); vice-president, G. W. Boughton.

Provincial vice-presidents—Quebec, Jas. Ballantyne, Montreal; Ontario, Geo. Gander, Toronto; Manitoba, Fred. H. Davidson, Winnipeg; Saskatchewan, R. G. Lecky, Regina; Alberta, R. A. Brocklebank, Calgary.

Secretary-treasurer—J. H. Lauer, Montreal.

Representative Directors—Quebec, Arthur Picard; Montreal, J. P. Anglin; Ottawa, J. Lackie; Toronto, John Aldridge; London, E. R. Dennis; Winnipeg, Chas. W. Sharp; Regina, D. J. McKay; Calgary, J. W. Aldridge; Edmonton, C. C. Batson; Lethbridge, H. J. Goode.

An extract of an interesting paper read at this meeting by Mr. Peter MacKissock will be found on another page. The detailed report of the proceedings will be published in our next issue.

The best of the channels constructed in this manner are as nearly uniform in cross section as they could be made by using teams and scrapers.

One of the ditches examined, which had been constructed about a year, was 6 feet wide on the bottom, 12 feet wide on top, 3½ feet deep, and in good order. In digging it two ½-lb. sticks of 50 per cent. dynamite were placed 3 feet apart in the ground and between 3 and 4 feet deep. Two men will construct a quarter of a mile of ditch in a day.

At a cost of 15 cents per pound for dynamite, and $20 per mile for placing the charges, the ditch in the condition in which it was examined, after a year of depreciation, had cost about 5 cents per cubic yard. The ditch had been constructed through the woods without cutting down any of the trees, and in some instances the fallen trunks were lying across the channel.

This method of construction is coming into general use in excavating lateral ditches in the wet muck soils of southeast Missouri. Its advantages lie in its usefulness for digging ditches too small for a dredge, and through ground too wet for economical work by hand or with teams and scrapers. Whether larger channels can be constructed by using larger charges of dynamite, placed at greater depths, remains to be seen. Sandy soils are not handled as readily as clay or muck, and where ditches have been blown out in sand, the cost per yard has been several times as great. Neither does the method work well in dry soil. The use of 60 per cent. dynamite has in some cases given better results than 50 per cent. If the success achieved by this method of excavation is repeated in other parts of the country, it will appear that we have added to our construction methods another means of earth excavation, applicable to wet muck and clay soils, under conditions where none of our former methods of excavation were economical for the construction of small channels.

Mr. A. H. VanCleve, city engineer, of London, Ont., has tendered his resignation, to take effect March 1st. This step, we understand, is attributable to his recent difference with the water commission. It is stated that a compromise may be effected.

According to the annual report of the Waterworks Engineer, Vancouver now possesses 174 miles of watermains, over 25 miles having been laid during the past year. There were 3,065 new water services laid in, making a grand total of 17,549. Seventy-six new hydrants were installed, increasing the total number in use to 902.

The Western Steel Corporation has secured ten millions of capital from the Carnegie Steel Corporation, of which sum two millions is to be invested in a steel plant near Vancouver. The whole of the capital will be utilized on the Pacific coast, some of it being intended for the extension of the company's steel plant at Irondale, Wash.

Over thirty-six miles of new streets were laid down within the eight square miles comprising Old Vancouver during 1910, ten miles being macadamized. Sewers and basement drains constructed aggregated eighteen miles. Over twenty-one miles of three-plank walks were put down in the various wards by corporation laborers, while contractors laid over twenty-three miles of cement pavement and put in two and one-half miles of cement curbing. Over three miles of permanent paving were completed, the unfinished sections totalling an additional nine miles.

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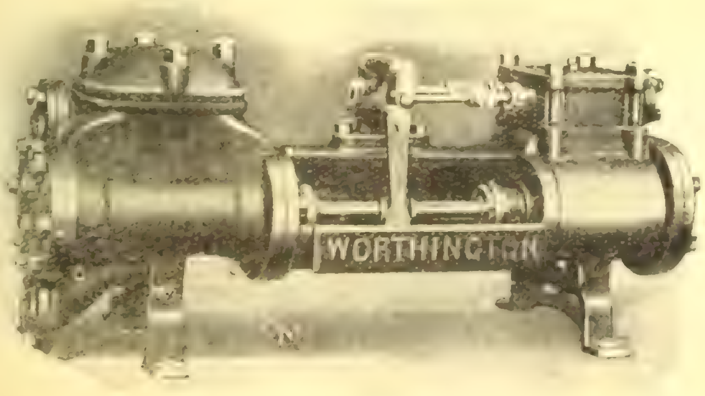

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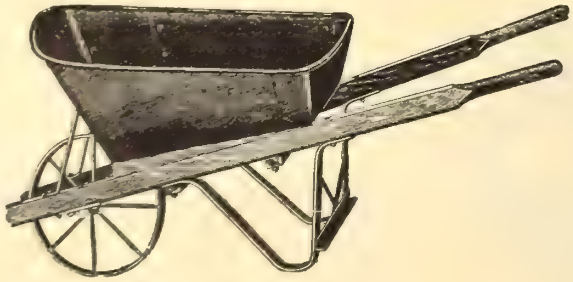

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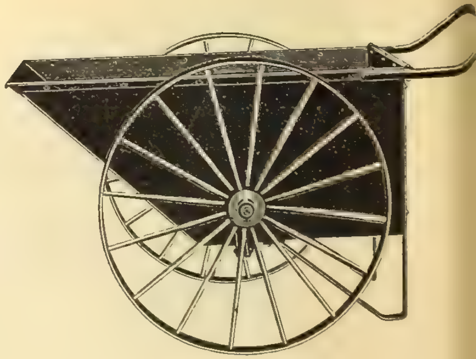

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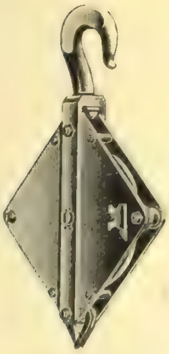

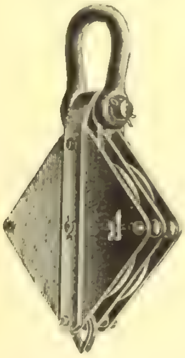

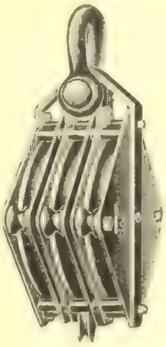

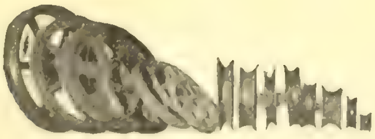

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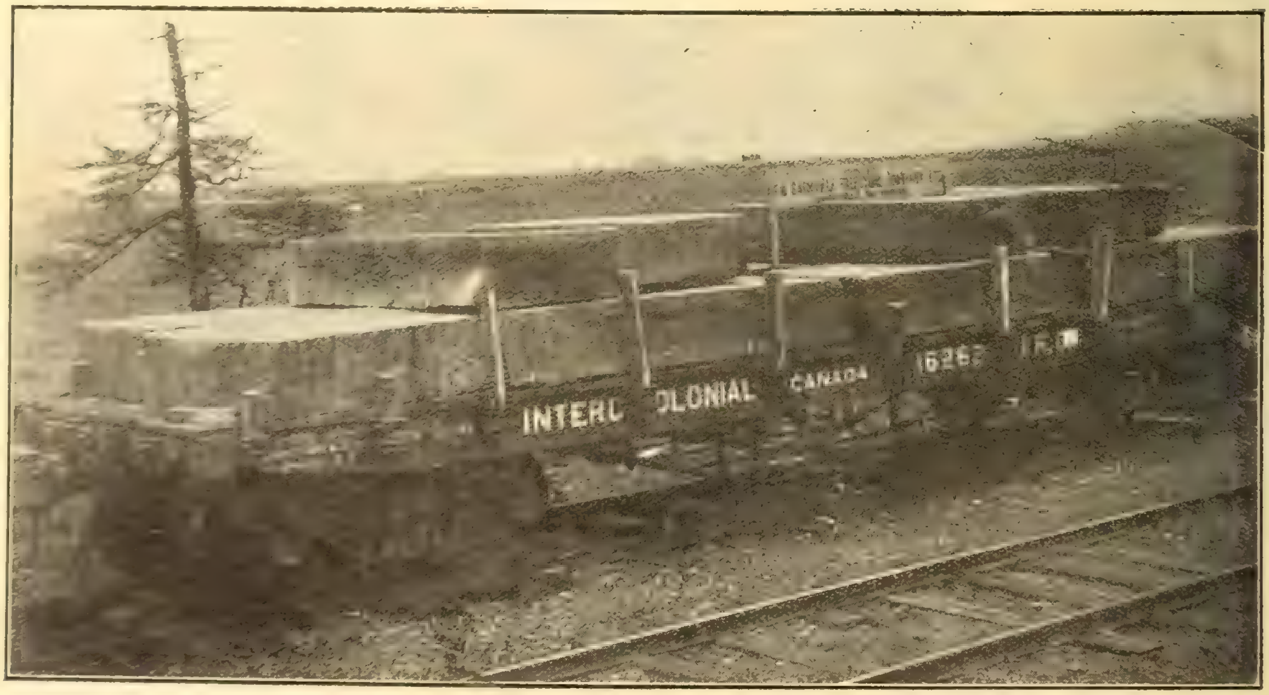

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Modus Operandi of the Public Press

The manner in which the Vancouver papers reported the recent discussion at Winnipeg anent the relations between the city of Vancouver and their engineer is a rich example of the capabilities of the public press in such matters. It also goes to show what a high value is placed upon sensational copy as compared with personal reputation. One of those who took part in the discussion at the convention of the Canadian Society of Civil Engineers was Mr. James Kennedy, who, upon his return to Vancouver early this month, did his best to remove the false impressions made at Vancouver. It was reported that Mr. Kennedy had stated that the city engineer had been dismissed. There was no truth in the report, neither was there the slightest intimation that his dismissal was under consideration. And certainly it was untrue that the Mayor had been accused of personal animosity, while the right of the council to act without interference from the society was never questioned. The society was well within its rights in having the discussion, and inasmuch as no resolution was made, criticism from the daily papers was particularly ill-timed and impertinent. The distorted versions of the discussion were a source of some annoyance and one is inclined to wonder whether after all the representatives of newspapers upon their appearance at such gatherings should not be required to furnish certificates as to their responsibility and good standing in the community. We would not advocate their exclusion, but we would certainly suggest the enactment of protective measures of some kind.

Winnipeg Setting the Pace

The first week of February was an eventful one in the building world in Winnipeg. During that week conditions changed and developments took place that had a remarkable effect upon the prospects for the year. Those prospects, at the end of January were of a fairly promising nature, but during the period named it became apparent to all who are thoroughly in touch with conditions that the outlook grew more promising day by day. A prominent contractor stated that he believed there had never been so much business in sight at that particular period of the year, as was the case at the end of the first seven days of February. While a great deal of that business had not yet reached a stage where figures were required, it was certain that the much greater part of it would materialize and that plans would be under way before the close of the present month. Already a number of the interested parties are making inquiries of consulting architects and contractors in regard to features of the work and conditions, and the interest displayed promises well for the building and construction business of the next few months. The projects under discussion include a number of large structures for business purposes.

Tile Business Unprofitable Under Present Conditions

Our attention has been directed to the unprofitable conditions obtaining on certain lines of goods used in the building trade. In the present instance, we would refer particularly to the tile business, the history of which during the last ten or fifteen years, in Toronto at any rate, seems to be that of non-success. One firm after another has withdrawn from the field disappointed to find that there was nothing [illegible] Possibly the labor entailed in the installation of the tiles is usually under-rated; the workmen may not accomplish as much work as they should, or again, proper allowance may not be made for changes which necessitate taking down the tiles and putting them up again without further remuneration. Whatever the cause it makes very little difference, but we understand that if costs were properly kept on many of the jobs taken at prevailing figures in Toronto the balance would show such a small margin as to make the business unprofitable, for the net result would be on the wrong side of the ledger. An industry requiring mechanical skill, decorative taste and business ability should not be prosecuted under such undesirable conditions. The way to improve it may possibly be more difficult than we suppose, but if we were asked to offer a solution we would certainly suggest a new basis of figuring.

Foreign Cement Barrels

Our attention has been called to a paragraph headed "Foreign Cement Barrels," published in our issue of December 28. From the information contained therein it might be inferred that the domestic barrel is inferior to that received from Europe. That this is not the case is shown by data received from the Canada Cement Company, Limited. The barrels used by this concern are manufactured by an English cooperage maker and have the same grooved and tongued stays, are headed equally as well and have four iron hoops instead of two, as mentioned in the former article. These barrels are also lined with waterproof paper, which makes them air and damp-proof. The Canada Cement Company consider them equal to any export barrel made abroad.

Erratum.—Our attention has been directed to an error which appeared inadvertently in an article "Our National Heritage," published on p. 43 of our last issue. The statement was made that "80 per cent. of the products of the Canadian farmer find a market in Canada." This should have read, "eighty per cent. of the products of the Ontario farmer find a market in Canada."

Practical Work in Engineering Training

Its Value and How it Should be Acquired—The Publication of Contractors' Data — Value of Itemized Cost Records

Office of the Chief Engineer, Intercolonial Railway,
Moncton, N.B., January 31, 1911.

Editor, Contract Record:

I have read with much interest Mr. Holgate's article in your issue of November 23rd, 1910, on "The Training of the Engineer-Contractor."

The summer days, weeks and months which comprise the college vacation should certainly be put to the best possible use by the student, and it should be impressed upon him by parents and teachers that this period of time should be a period of real practical work, at something pertaining to, or in some way connected with the course which he is pursuing in college. Mr. Holgate has suggested that he should be so interested in his vacation work, whatever it might be, that he will have gained enough information on it to write a paper when he returns to college, and have it counted in his regular examination marks.

If this were made a college rule, I believe that it would be a very great assistance to both professors and students. The student would immediately become more interested in his vacation work. He would be more observant; he would not hesitate to ask questions of persons who knew how to do some one thing well; to make notes of methods of work suited to particular situations; to make quick estimates of what the work was costing, and to think out quicker and cheaper ways of doing it. Everything around us is capable of being improved upon; but the man who really thinks is somewhat of a rarity. Thinking is hard work, and a college professor has said that the average student does not do ten minutes' hard thinking in a day

Should a student be fortunate enought to secure employment with, say, a building contractor, he should be very careful to get permission from his employer to take notes on machinery, methods of doing work, and to make sketches, ascertain costs, etc. His notes and sketches, and his paper, if he writes one, should be submitted for his employer's approval before it is handed in to his college; and it should never afterwards appear in an engineering paper of society proceedings or transactions without the employer's special permission. I have known much trouble to arise between contractors and inspectors owing to the publication of descriptions of the contractors' machinery, methods of doing work, materials used, etc., without the contractor's permission.

Where competition is keen, many contractors object very decidedly to having the world know precisely how they handle their work, or to having some of their pet improvements or trade secrets minutely described for the benefit of their competitors.

Students are becoming less averse to taking hold of whatever comes their way in vacation work; and this is well, because the students are so many and the works so few. There will always be some swelled heads though, like the young man who was afraid to let his parents know that he was "time-keeping" for a contractor, as they would probably think the work much beneath the dignity of their would-be-engineer.

I do not see how practical work and cost-keeping can be taught in the college without great loss of valuable time. It might perhaps be done to a limited extent by having up-to-date tables of costs for every conceivable kind of work, varying between certain limits, to cover differing circumstances; and these costs might be used by the students in making estimates, so that they would thus obtain a knowledge of costs in a general way.

In practice, no two jobs are precisely alike, and actual costs at one place will not cover actual costs at another place.

Good judgment and knowledge of local conditions are always necessary to a successful contractor. How are college professors to acquire such judgment and knowledge? Would not special teaching on the subject of costs be more likely to do harm than good, since there would be no certainty that the assumed costs would apply to any particular locality? The majority of contractors have no rigid system of cost-keeping. If the work is paying as a whole, they are apt to do the best they know how, all round, and let it go at that. If they are losing money, they will investigate the individual parts of the work sufficiently to find where the trouble is and improve it, if they can. At the close of the work, the actual cost of the individual parts of the work are not, as a rule, reduced to such a state of perfection that they are entirely applicable to the next job, and ready to be written into the next tender for work in another part of the country.

Itemized Cost Keeping.

In future, as competition becomes keener, it will be necessary to pay greater attention to cost-keeping of the individual parts of work. Then we shall see less frequently engineers estimating that hardpan can be removed by hand from sewer ditches for 50 cents per cubic yard, at the same time contractors are actually paying 90 cents to $1.25 for removing the same material from similar ditches half a mile away.

A student can find a great deal to learn, if he keeps his eyes open, even in the simple operation of digging a sewer ditch. Does it require one picker to a shoveller or will one picker keep two shovellers going? One or other may make or break the contractor. If the material, for some reason, becomes saturated with water, he will soon find that the cost is multiplied by two. If quicksand is encountered and sheet-piling is required, with the winter close at hand, the contractor's price will need to be a good one to bring him out whole; when some of the backfilling is sure to be frozen, so that it will need to be picked over again.

The simplest performances such as these are full of information and suggestion for the student who can think and reason, and who is anxious to collect some out-of-school wisdom to carry back to his college, and later realize where some of his theory fits into his practical experiences.

Our technical colleges are doing excellent work and Canadians may well be proud of them.

Yours truly,
William B. Mackenzie,
Chief Engineer.

New Bank Building at Winnipeg

The Bank of Commerce now under construction at Winnipeg
Darling & Pearson, Architects; Lyall-Mitchell Company, Contractors.

The Canadian Bank of Commerce has under construction at Winnipeg a new building, to replace the one which was recently taken down and which stood on Main street. The new structure will be six storeys high from the street and will have a basement and sub-basement.

The front will be constructed of gray granite. The columns will be eight in number and will be six feet in diameter at the base. The walls will be constructed of hard burned brick.

The foundation is of reinforced concrete. The excavations for the boiler-room reach a depth of thirty-two feet. The savings bank vaults and safety deposit vaults will be built in the sub-basement.

The banking room will occupy the main floor and will extend upward for three storeys. The floors of this room will be tiled, the tiles being laid on reinforced concrete. The floors in the offices above will be of hardwood, laid on reinforced concrete. The ceiling above the banking room will be supported by a steel truss.

The height of the building from the street level will be 97 feet, the width 104 feet 1 inch, and the depth 120 feet.

The cost mentioned in the application for the building permit is $800,000.

Messrs. Darling & Pearson, of Toronto, are the architects, and Messrs. The Lyall, Mitchell Company are the contractors for the erection of the building. Mr. Robert Wilson is the representation of the contracting firm.

A somewhat remarkable feature in connection with the project is the fact that Mr. Wilson superintended the erection of the Bank of Commerce building which was erected on the same spot in 1899, he also had charge of the work of taking down this structure, and is now looking after his company's interests in the erection of the new building.

The former building was crated and shipped to Regina, where it will be rebuilt.

Permeability of Concrete

That brick pavements, and in fact pavements made of all kinds of material, expand with the heat and contract with the cold is of course well known; such expansion in some instances resulted in the arching of a pavement, the center lifting in some cases several inches from the foundation. We do not recall, however, having seen any figures as to the actual amount of expansion and contraction caused in pavements by temperature changes. An investigation of the amount of such movement is being undertaken by the United States Bureau of Standards, which has sent from from Washington two of its engineers to study the brick speedway at Indianapolis, which is considered perhaps the most perfect specimen of brick paving in the country. From the results of these tests it should be possible to estimate with more exactness the size of expansion joints which it is necessary to provide in constructing brick pavements of various widths and in various climates.

At the same time these engineers propose to test the rigidity of the pavement—that is, the deflection occasioned by the passing of a load over it. For this purpose a sensitive spirit level will be used which will indicate a change in level at one end of one ten-thousandth of an inch. This would not seem to have as much immediate value to the engineer, although it may serve to indicate the value of certain coefficients of elasticity and other properties of brick pavements.

Motion in Brick Pavements

Studies have been made by the Board of Water Supply of New York city of the effects of various fine materials incorporated in the matrix of concrete in reducing permeability, including clays, hydrated lime and puzzolan and sand cements; these two cements being more finely ground than Portland cement. The conclusion reached was that concrete, practically impervious under 200 ft. head, can be produced with any of these materials, but that equally good results can be secured at no greater cost by using sufficient Portland cement, the latter method having the advantage of securing concrete of increased strength, while the other materials usually reduce strength.

Convention of Ontario Good Roads Ass'n, March 1-

Concrete Pile Foundations in Drilled Holes

A job of underpinning required by unusual conditions and carried out by a novel scheme has recently been completed in the new terminal of the New York Central & Hudson River Railroad at New York City.

Near the northerly end of the yard, 54th street crosses the yard on a concrete-floor bridge, carrier by steel girders resting on columns set outside of the central tracks. The columns supporting the easterly end of this bridge have shown a settlement, due to a compression or a movement of the soft material which occurred in a pocket of the rock at this point. The remaining columns of the street superstructure nearby have their footings directly on rock, but under the group of four columns just at the bridge the rock dips to 15 to 20 feet below the track level, and at this point the settlement has occurred, in spite of the fact that the concrete footing was constructed about 4 feet deep here.

Drilling 14-in holes for Concrete Underpinning Piles

It was therefore decided to provide a more secure foundation by underpinning the present columns without removing them, and carrying the foundation to rock, after which the original level could be restored by jacking up the columns. On account of close proximity of the main line tracks to the columns, any excavation would have interfered very seriously with the traffic on the adjacent tracks, and due to the danger to traffic, it was decided it was not feasible to cut or blast out the concrete footing wall or the protection pier which extends above the foundation footing about 6 feet. The engineers in charge, therefore, decided to put holes down to rock and to cast concrete piles in these holes.

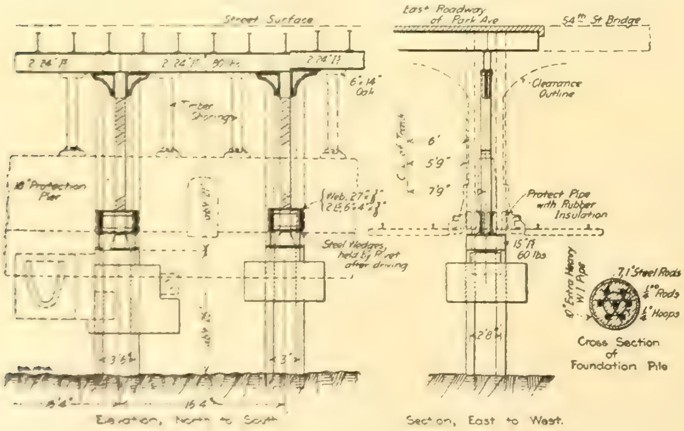


Fig. 2.—Sketch of Street Bridge Columns, showing new Foundations

In using these machines the plan was to drill down four holes close together around each column, driven through the concrete footing to rock and penetrating into the rock far enough to make sure a sound bottom had been reached, then to cast reinforced-concrete piles in these holes, place an I-beam grillage on top of the four-pile group and rest the column on this new base.

The work was carried out without incident or extreme difficulty, except the interruption and slow progress occasioned by the drilling through reinforcing rails embedded in the concrete, timber grillages and boulders in the soft material below. The drills were set up on the street above (see view Fig. 1) and worked through holes cut in the street floor. The first operation was to drill a 14-in. hole down through the concrete footing. Through this a 10-in. extra heavy steel pipe was driven through the soft material to rock. The hole was afterwards cleaned out and a 5-in. core hole was put down into the rock from 4 to 8 feet in order to ascertain if bed rock and not boulder had been struck. In case the drill passed through the rock into the soft material, showing that a boulder had been struck, the steel pipe, whose lower end was fitted with a thick cast-steel drive shoe, was driven down through the obstruction by a heavy ram. When a final bearing on rock had been secured, reinforcement consisting of seven 1-in. longitudinal rods with ¼-in. wire wrapping, previously made up on the ground to the length required, was lowered into the hole and then filled with a 1:2:4 mixture of concrete, carefully tamped or churned into place.

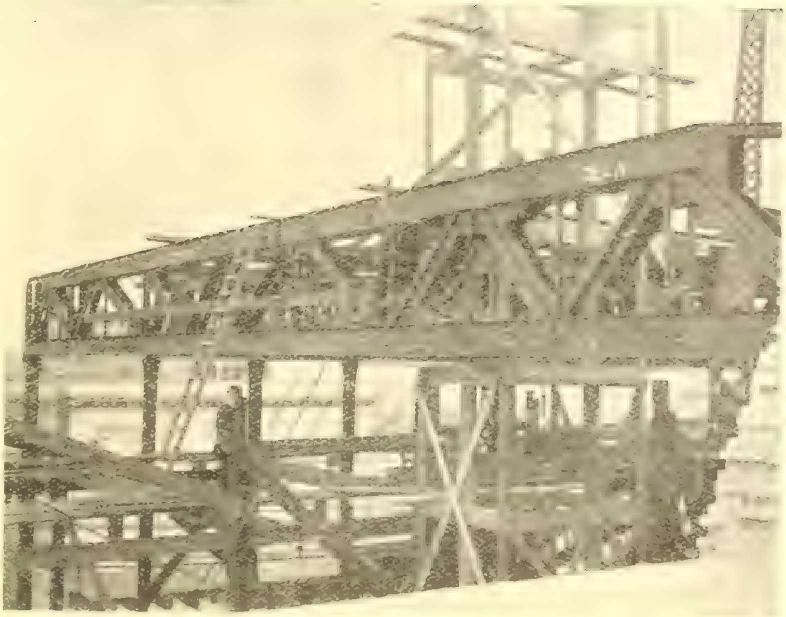
The four piles of the set were spaced 3 feet longitudinally, 2 ft. 8 ins. transversely, or as close as the column base permitted. The entire work included only 16 holes, but, due to its nature, required about two months to complete, with two machines at work during part of the time. The drills, one a Davis, the other a Terry (both shot drills), had no difficulty in cutting through the concrete and the reinforcing rails of the foundation. Most of the delay in the work was caused by striking boulders in the soft material and timbers.

Test borings to determine the character of the material along the line of the new high level intercepting sewer now under construction at Toronto, were made with an auger operated by hand. The material for the most part is stiff blue and yellow clay, containing some small boulders. The auger bit was about 1½ inches in diameter and was screwed into the end of a section of pipe. As the hole was deepened successive lengths of screw-joint pipe were added and the line of pipe sections with the auger at the bottom end was rotated by Stillson wrenches. Holes were put down in this manner to depths of 20 to 30 feet and the cost was from 25 to 30 cents per linear foot. As a rule the material is stiff enough to stand up in the hole without caving. The bit is withdrawn frequently and samples of the material removed from the auger and placed in glass jars for future reference. When large boulders were encountered which could not be passed by the bit new holes had to be started.

Noteworthy Steel Truss

An example of structural steel construction which has many remarkable features is that from which the illustration published herewith is taken. It is one of three steel trusses recently placed in position in the new Bank of Montreal building at the corner of Portage avenue and Main street, Winnipeg.

Each truss is 90 feet long and weighs 38½ tons. They are the longest trusses ever constructed at Winnipeg and constitute the heaviest piece of steel structure work yet constructed in Western Canada.



The first of the three largest Trusses yet constructed in Winnipeg, all of which will be used in the new Bank of Montreal Building. Each Truss is 90 feet long and weighs 38 1-2 tons.

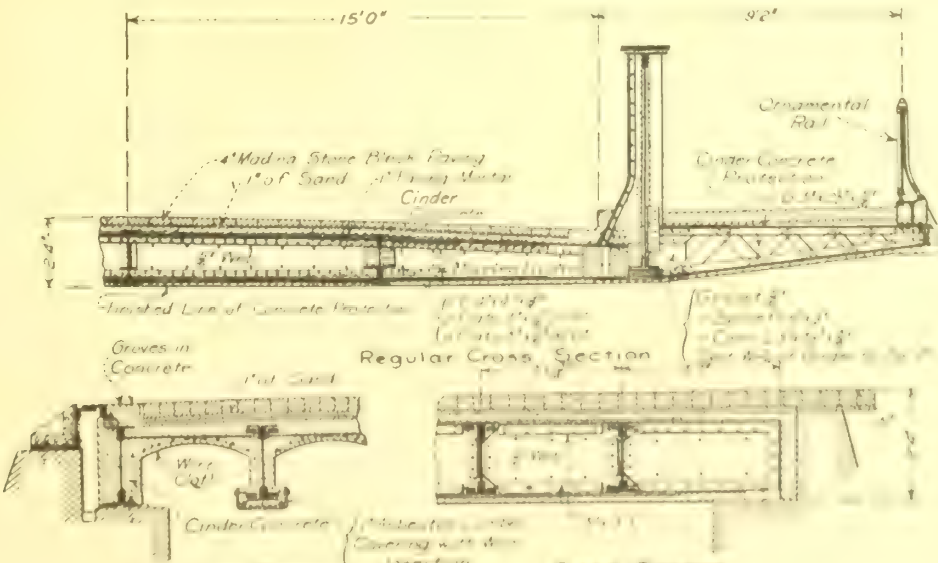
These trusses are built up of plates and angles with top and bottom chords of box section. They were shipped from the works in three main sections, the heaviest of which weighed 20 tons. Six teams were required to haul each section to the site, where they were moved from the wagons by means of rollers to the main floor of the bank. The several sections were then assembled and rivetted up into one complete truss. The trusses were raised into position to the top of the steel columns, about 50 feet above the floor, by means of two latticed steel gim poles, one placed at each end. To the underside of the finished trusses is attached the ceiling of the main banking room, making a clear height of 48 feet from floor to ceiling. These three trusses are designed to carry two floors, which, when completed, will contain living rooms for some of the employees of the bank, besides other rooms.

The trusses are a portion of a total order of 700 tons of structural steel supplied for the Bank of Montreal by the Manitoba Bridge & Iron Works, Limited, to Messrs. Norcross Bros., the general contractors. All the steel was fabricated under the inspection of the Duckworth-Boyer Inspection Company, Limited, Montreal, through their western representative, Mr. Geo. Campbell.

Messrs. McKim, Mead & White, architects, of New York City, designed the bank building and all the steel used in it. Their representative in Winnipeg directly in charge of the work is J. N. Semmens.

Kensington Avenue Bridge, Buffalo

Kensington avenue, Buffalo, is carried over five tracks of the New York Central & Hudson River Railroad by a through plate girder, and deck I-beam bridge, with the steel work protected from the locomotive fumes. It is 50 ft. 4 in. wide over all, and has one 64-ft. 7-in. through plate girder span over four tracks and one 20-ft. 4-in. deck I-beam span over one track, supported on a concrete pier and on two concrete abutments nearly parallel to the tracks. It is proportioned for



Details Kensington Avenue Bridge

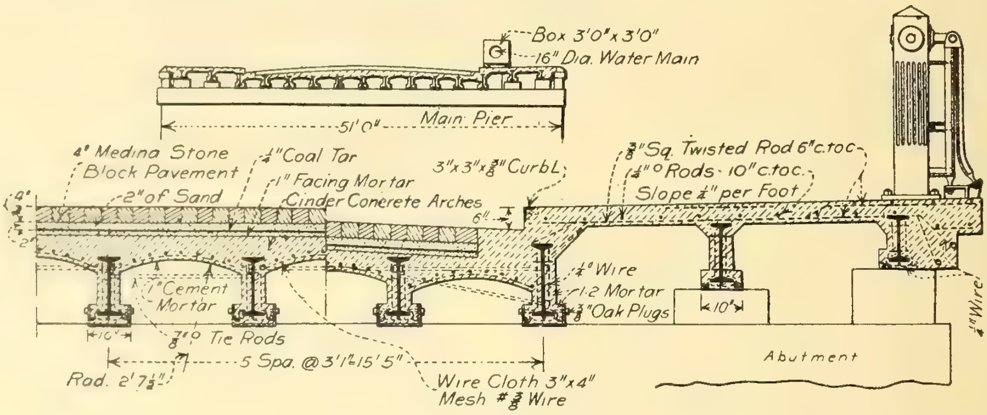
live load of 100 lb. per square foot and a road roller with 26,800 lb. and 18,000 lb. on axles 11 ft. apart.

It is designed in accordance with the specifications for the extension of the Buffalo grade-crossing improvements, and the long span has two main girders about 7 ft. deep over all, and 32 ft. 6 in. apart on centers which are proportioned for a dead load of 4,900 lb. per linear foot. The loads and allowance for impact produce a maximum flange stress of 4,232,000 lb., which requires a net area of 34.8 square inches made up with 8 x 6-in. flange angles and cover plates. The girders are connected by rivetted floor beams 3 ft. apart, with heavily reinforced top and bottom flanges, the latter being horizontal, and the former being curved to correspond with the roadway crown.

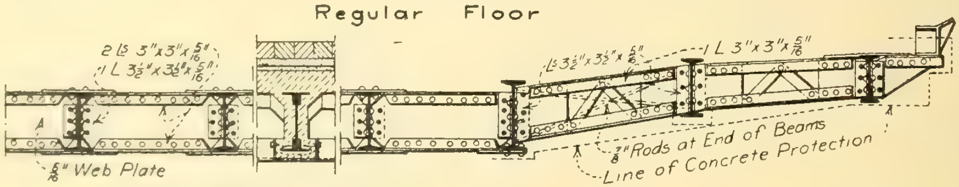
The floor beams are connected to the girders in the usual manner by end sections of the web plates which extend beyond the top flanges of floor beams, and are field-riveted to the vertical stiffener angles of the main girders. They are special in that the do not form gussets reaching to the top flange of the main girder, but terminate a little below the neutral axis of the girders, while the flange angles which stiffen their inclined edges are continued to the top flange of the main girder, being bent where they intersect with the stiffener angles in girders. This was done in order that the angles might be carried to top flanges of girders for stiffeners with a minimum encroachment in clearance. Lattice girder cantilever brackets about 9 feet long project from the outer faces of the main girders in the plane of the alternate floor beams to carry the sidewalks.

The floor beams are braced by three lines of longitudinal plate girder diaphragms with continuous top and bottom cover plates, which, like the floor beams, are entirely enclosed in cinder concrete. The spaces between the floor beams are spanned by cinder concrete arches 6 in. thick at the crown, made 1:2:4 with Portland cement, and reinforced 1 inch above the soffit with 3 x 4-in. mesh Clinton wire cloth. The bottom flanges of beams, girders, brackets and diaphragms are covered with 1:2 Portland cement mortar, reinforced with ¼-in. rods and 1 x ⅛-in. soffit clips. Asbestos lumber troughs of ¼-in. reinforced material were attached to the mortar protection of the bottom flanges of the floor beams and diaphragms by oak plugs embedded in the mortar. It was thought that cracks due to the deflection of the shallow floor beams might develop in the mortar protection covering and permit the locomotive fumes to attack the embedded steel. The asbestos troughs were used to cover any such cracks, all joints in the sections of troughs being covered inside with thin asbestos sheathing.

The roadway floor is finished with 1 in. of mortar, on which there is a 1-in. sand cushion covered with Medina stone block paving 4 in. thick. The sidewalk has a flat concrete slab 5 in. thick, made of 1:2:4 stone concrete reinforced by 1 per cent. of twisted ⅜-in. rods. All structural steel embedded in the concrete is first covered with 1 in. of Portland cement mortar or is brushed with Portland cement grout. Above the floor there is no concrete protection for the steel, which is painted in the usual manner.



Regular Floor



Diaphragms at Center of Span

Details Kensington Avenue Bridge

The short span has 15 and 18-in. longitudinal I-beams about 3 ft. apart, carrying 1:2:4: cinder concrete arches and a roadway similar to that of the long span. The I-beams are enclosed with concrete protection like the stringers in the other span and are connected at their center points by plate girder diaphragms under the driveway, and by riveted open frames under the sidewalks. Longitudinal girders have sliding bearings at the expansion ends where the floor is carried over the back wall by the usual sliding apron plate.—Engineering Record.

The maximum fee which Messrs. Hering & Fuller will charge the city of Montreal for drawing up plans and specifications for the filtration plant is $31,000. This is on a basis of about 2½ per cent. of the total cost. The plant when completed will cost $1,257,000.

The Dominion Trust Company, of Vancouver, B.C., are about to commence the erection of a 6-storey building at Victoria at a cost of $135,000.

The Reminiscences of a Master Builder

Early Apprentice Days in Scotland—Later Impressions: Employer and Employee, Builder and Owner—Insufficient Remuneration of Contractor

By Peter MacKissock, Winnipeg

It would have been comparatively easy to have culled some facts from the most up-to-date text-books, diluted with copious extracts from the Encyclopedia Brittanica, added a few technical matters from my own experience and inflicted the whole heterogeneous mess on this long-suffering audience as a contribution from a scientifically-minded 20th century master builder.

It is, however, more and more borne in upon me as I grow older, that as a rule we take ourselves far too seriously, and expect others to take us at our own valuation. This has a tendency to develop us, consciously or unconsciously, into "poseurs," and our public pose gradually becomes more important to us than we really are.

The apparently wisest individuals I have ever seen were six owls that I saw in Stanley Park in Vancouver. These owls sat roosting on a stick, in a cage, and were miracles of preternatural gravity, and of overwhelming, mysterious, sphynx-like wisdom. I looked at them with a deepening sense of my own unworthiness and hopeless ignorance, and was about to efface myself from their neighborhood and drown myself in Burrard Inlet, from sheer disgust at my own utter insignificance, when one of them winked at me, quite distinctly; and the scales fell from my eyes, and I realized they were only posing for the public benefit, and that they did not really know very much more than the rest of us. So I thought that to-day it would be well for me not to attempt too high a flight but to remember that we are brothers-in-trade, gathered from east and west, largely to make or renew acquaintanceship, and to rub shoulders with each other so that we may reduce our angularities of thought and disposition, and get rid of that tendency to provincialism which prevails sometimes almost unconsciously. Therefore, with your permission, and premising that I am a very ordinary individual indeed, much more desirous of learning than capable of teaching, and holding all forms of self-advertisement in detestation, I shall try to give you a few reminiscences and impressions which, after all, have no special value except that they are my own, and may wake some responsive chords in the hearts of other master builders present.

When I tell you that I have been a master builder for some 200 years you may think I exaggerate slightly, but if there be anything at all in the theory of heredity, it is an undoubted fact.

In my own personal share of that time the individuality most impressed upon me, so far as building matters are concerned at least, is that of my own apprentice foreman.

How distinctly I recall him, clear hewn in deep relief upon the tablets of my memory! Not only had he been principal foreman to my late father as far back as I can remember, but he had also been his friend. He was a native of Stirlingshire, Scotland, and he had the fresh ruddy complexion and springing step of the mountaineer; strongly marked and characteristically Scotch features, and keen, bright blue eye. With the kindest heart imaginable he had the harshest, most strident voice which ever emanated from the lips of mortal man. I have known that voice strike terror into the heart of many a mild young Irish laborer.

My earliest recollections of my old friend cluster round his visits to our home at "New'r-day." For years he was our "first-foot," and the fateful hour of twelve had hardly done ringing when he was at the door and had passed in, fresh and cheery, bringing with his very presence a breath of breezy mountain air and several blends of Mountain Dew. His pockets bulging with oranges, sweeties and shortbread, he would wish us all a "hearty guid New Year." That shortbread, of his own manufacture, I shall never forget. "A' made it masel," he would say, his face beaming with honest pride, and we could well believe it. It was of the strength, consistency and flavor of a well-made slab of concrete, and for armour plating for a Dreadnought it could not have been excelled. But we children ate it. We were young and our cares sat lightly upon us, and at the risk of life and teeth we ate it, even if, like other daring ones before us, we "bitterly thought of the morrow."

The Writer's Early Training.

Old Geordie "put the tools into my hands," as the phrase goes in Scotland, both for stonecutting and masonry (he was a past master of both) and for the next few years I practically belonged to him. Let me here say for the benefit of those who are not acquainted with the old Scottish "feudal system" of making a master builder, that the fact of my being the boss'es son did not in the least prevent me from being subjected to an iron discipline, which I think Geordie, as a staunch Radical, rather enjoyed on the son of an equally staunch Conservative. And yet, advanced liberal though Geordie was in politics, he also was, like many of my race, most conservative so far as old customs were concerned. With regard to clothing I am certain he regarded masonry and "moleskins" as inseparable, and I can well remember the ineffable contempt with which he used to regard some of the younger generation of masons who so far forgot what was due to custom and tradition as actually to appear in what old Geordie called their "Sawbath troosers." He seemed to feel that in tampering with the sacred moleskins they were removing the ancient landmarks and that the end of all things was near.

He insisted of course upon my wearing the correct costume, and nothing pleased him better than taking me down town on a Saturday night to buy me two pairs of these white moleskins—one pair to wash the other. On one occasion he was rendered supremely happy by my being persuaded to go in for, as an extra, a pair of the infinitely more aristocratic "Windsor Corduroys," a material whose wearing qualities are expressed in the words of the Psalmist, "And shall from age to age endure." I was not so happy as he because those "Windsor Cords" were, when new, of a bright yellow, making me look, at my callow and growing age, like a gigantic yellow canary; but old Geordie was delighted, and I liked him so well that I was content.

Using the term "master builder" in its true sense as expressing the mastery of that trade, as apart form "employer," I have yet to meet a better master builder than old Geordie Taylor. With him, "bond" was a religion, and his plumb rule, square and level were to him as the Ten Commandments. Methods may and do vary, new materials and conditions are introduced, but the great fundamental principles handed down to us by Assyrian, Babylonian, Egyptian, Greek and Roman are eternal, and these my old apprentice foreman had absorbed into his very being. Slovenliness, sloppiness and rule of thumb he would not tolerate, and I

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*Extract of Paper presented at the C.N.A.B. Convention, Winnipeg, February 15-16, 1911 am certain that he considered our own business as the only really important one, and all others as subsidiary and inferior, if not altogether unnecessary—after all not a wholly bad creed for a master builder.

In the days of which I am at present speaking—the early eighties—many stonecutters, masons and others, were constantly coming and going between my father's employment in Glasgow and New York, and other American and Canadian ports, and it seemed the natural thing for me, immediately on the expiry of my five years' indentures, to sail for New York City. Besides it ran in the blood for us to become real "journeymen," and my father had preceded me in a long visit to this side many years previously, having helped to build the old City Hall in Hamilton, Ont., about 1860, I should think.

Different methods in the stone yard and in the building crowded in on me and I had a busy time assimilating them all, hanging on to the sheet anchor of what old Geordie taught me, and developing my technical training at the same time. I wanted to see all I could in the States, and I did—from Boston to New Orleans, and from Charleston, S.C., to Mexico. It was at that period, too, when as a necessary addition to the excellent education and technical training which I owe to my respected father, I received that further education which only the old soldier can give to the raw recruit. It was in New York where one of the many witty Irishmen whom it has been my privilege to count as friends, helped educate me by not paying me the compliment I fished for. I had just adopted the new collar as neckwear, the stand-up all-round, clerical-looking one which had just come into fashion. I was young and I wore it good and high, and I asked Anthony how I looked. In his south of Ireland accent he replied, "Ye look like nawthin' but a cuddy lookin' over a white gate."

During the twenty-five years which have elapsed since I became, in the original and true meaning of the term, a "journeyman," and started out after the higher degree of master builder, I have seen, like Ulysses of old, "many lands, many men, and many cities," not without observing, and many impressions have fixed themselves idelibly in my mind.

Relations Between Employer and Employee.

The first is in reference to that which is always with us, viz.: the relations which exist between employer and employed. I do not wish to pose as an authority on political economy, and so I shall avoid the terms capital and labor. After all, are not these terms somewhat misleading in this instance? Are not we ourselves in the ranks of labor, producing, after the hardest and sometimes most thankless work, almost wholly for the benefit of capital? "Employers" and "employed" let it be therefore.

The point of view at the moment seems to be that we have taken two different sides in a gigantic struggle, which shall leave one side forever at the mercy of the other, and that our interests are eternally antagonistic. My impression is, as I have indicated, that this is an entirely wrong position.

After much consideration I am of the opinion that trades-unionism ere long will be a thing of the past. The inherent defect of trades-unionism is that the fact of a workman being a member of any union does not guarantee his efficiency in the trade which that union represents.

Compare this with the requirements of the men who have gone before, men whose handiwork the modern mechanic has not yet excelled—in many cases not yet equalled. Into the old Guilds which flourished during the Renaissance in Italy, no man could enter without proving his efficiency, and the very fact of his being a member was a guarantee that he knew his business, and knew it thoroughly. Glass-makers of Venice and Murano, goldsmiths and sculptors of Florence and Rome, their trades-unions guaranteed efficiency, and there was not even a genius like Benvenuto Collini, or the mighty Angelo himself, but had to prove to the satisfaction of the board of examiners that he could actually produce with his own hands the finished article of his trade. This example was followed all over Europe, and in the Old Country, and is still a part, more honored in the breach than the observance nowadays, of the constitution of my own guild—that of the Incorporation of Masons of the City of Glasgow. This condition of things containing the true principle which gave long, healthy, and productive life to the old guilds, is entirely lacking in the trades-unions of to-day.

Another fatal defect is that notwithstanding the clear teaching of all history that force is no remedy, the unions are coercive with regard to their fellow-workers or would-be fellow workers, and are becoming more and more artificial. The inexorable fate of all superimposed tyrannies awaits them.

I do not here deal with organized labor as apart from present day trades-unionism, and I differentiate between them. I look, on the other hand, for a future development which shall be far-reaching, indeed.

I have long been impressed with the advantage of the working agreement between employers and employed, provided it is approached and entered into in the right spirit by both parties to it, and loyally adhered to. Otherwise it is useless. The spirit of suspicion, quite different from watchfulness, is to be deprecated, and the spirit of mutual understanding encouraged. I have known a threatened strike to be averted, largely because the employees were satisfied that the president of the Master Builders' Association, of which I was then a member, had the interest of the whole trade at heart. He was able to bring them to see that the interest of employers and employed were not antagonistic but identical. Events proved him to be right. This end was only attained by belief in mutual good faith, supplemented by the clearing up of many misunderstandings, some of them trivial enough.

The Builder, the Architect and the Owner.

My next impressions are connected with the master builder's relations to his employers, the architects and owners.

My experience has been that the really good architects—men who have been decently bred, and who have had a good training, and above all, who have the right atmosphere about them—are always the most approachable, and the most free from assumption of superiority, and snobbishness generally. Further, I have always found that the most capable architects, those of the best standing in their profession, are invariably ready to give courteous consideration to any suggestion from an experienced contractor, and to give a master builder credit for taking interest in his work for the work's sake, apart from the "dollar-and-cent" point of view.

I have, of course, met the other type of architect, a cross between a putty man and a peacock, and he is the gentleman who looks upon the contractor as a convict out on ticket-of-leave, and not reporting himself regularly. It is he who draws a specification and terms-of-contract in which the sole rights reserved to the contractor are to pay out wages; hand checks to the supply people; cover up and pay for the architect's blunders, omissions and general incompetency; be responsible for the upkeep of the building during the rest of the term of his natural life; and then, having washed his feet and shaved his head, he may crawl to the footstool of the Most High, and get a certificate for 67 per cent. of the work done—perhaps. Ten years after the contractor's death his widow may collect the final balance.

To such an architect I would recommend the study of the old proverb, "It's a long lane that has no tomato can."

But on the other hand, it is the master builder's duty, as it ought to be his pleasure, to treat the architect with the courtesy he himself expects, to back him up and handle his work without worrying the architect unduly, and generally to act "on the square" with him.

Insufficient Remuneration.

One other point which impresses itself upon me is that in consideration of the training he has had, the enormous amount of figuring he has to do, the constant keeping of himself abreast of his times or a little ahead of them, the worry and responsibility he undertakes, I do not think the ordinary contractor is anything like sufficiently remunerated. Wherein does the remedy lie? Here, at the opening of 1911 we are looking forward to a vast amount of good work. Will the present entirely irrational system be continued? If so, why?

Lastly, let me put myself on record once again as being impressed with the advantage of an apprenticeship to some section of the business for all master builders. This apprenticeship should be supplemented by a thorough technical training, prepared for in the schools as far as possible.

* * *

As a closing thought let me recommend to myself, and to my brothers-in-trade these golden words of the old Roman emperor and philosopher, Marcus Aurelius:

"At what time soever thou wilt, it is in thy power to retire into thyself, and to be at rest, and free from all businesses. A man cannot any-whither retire better, than to his own soul; he especially who is beforehand provided of such things within, which whensoever he doth withdraw himself to look in, may presently afford unto him perfect ease and tranquillity."

Maintenance of Macadam Roads

The Edinburgh county road surveyor gives the results of his observations in England and his experience in Scotland with respect to the use of tar and pitch as binding materials for stones used in making and repairing roads. The four methods of applying tar are: (1) Tar spraying; (2) tar macadam; (3) pitch grouting; (4) tar matrix.

The above methods and cost per superficial yard over ordinary macadam, detailed by the county road surveyor, are here summarized:

Tar spraying.—It is essential that all dust and caked mud be removed from the road before the liquid is applied. After tarring, a slight sprinkling of whinstone screenings is spread over the surface. Hand tar spraying is considered superior to machines, although it costs slightly more and takes longer. In this process tar is not so much a binder as a waterproof protection to the road surface. It is soon worn away, however, and when broken up the road is thrown into an uneven and dirty condition. It is now admitted that tar spraying lasts only for one season. The life of a road subjected to much fast motor-car traffic is increased 15 to 20 per cent. when tar sprayed. One of the main thoroughfares in Edinburgh County costs on an average $1,460 per mile per annum to maintain as at present. If tar sprayed its whole width the cost would be $1,800 per mile, after allowing for the increased life of the road, as above indicated.

Tar spraying is most suitable for county roads where expenditure is limited, and although tarring the entire surface would be preferable, a width of 10 to 12 feet in the center would accommodate motors and protect the metal bed, allowing at least double the length being sprayed, and leaving the sides with a better foothold for horses during frost.

Tar macadam.—This consists of thoroughly mixing the stone with tar and pitch previous to its being laid on the highway. All stones should be dry, which necessitates preparation of the material under a covered structure. Tarring may be done by hand or machinery. It is usual to allow the material to lie in heaps one to three weeks to mature before applying. The coatings are applied in three layers of 2½ and 1½ inches and ½ inch stone, rolled separately, and finished with a thin layer of fine dry screenings. Tar macadam roads are easily cleaned, and the cost of maintenance on an average of years is less than ordinary macadam. It is slippery during frost and unsafe on gradients steeper than 1 in 20. Under very heavy traffic it loses its bituminous surface in two or three years, and the top layer becomes separated from that below. This system involves a comparatively heavy initial expenditure, and its general adoption on county roads would appear to be impracticable.

Pitch grouting.—This consists of application to a scarified road, rolled smooth, of a 3 to 4 inch coat of whinstone metal, consolidated in a dry state, after which boiling pitch and tar is poured into the joints, sprinkled with small whinstone or limestone gravel, and rolled until thorouhgly hard. The composition is made up as follows: Pitch (best coal tar), 1,100 pounds; refined tar, heavy bodied, 800 pounds; creosote oil, 100 pounds; total, 2,000 pounds. The mixture is applied to the roads at boiling point with spray cans, whinstone chips are immediately applied, and rolling at once undertaken. This composition is of a quick-setting nature, but retains considerable viscosity. The surface must be thoroughly dry before it is applied. The surface is smooth, but not slippery. The traffic is carried on the metal and not on the tar, as is the case with tar macadam, tar painting, or tar matrix. This is regarded as the best system for tarring county roads, as it makes them almost dustless, effects a great economy in cleaning, is easily repaired, and the life of the road is increased by at least one-third.

Tar matrix.—There are three methods of applying tar matrix. It is usual to slightly scarify the existing road surface. The first is to spread a layer of small gravel, previously tarred, to a depth of 1 inch to 1½ inches, on which is laid ordinary road metal. This is rolled until the matrix is forced to the surface. In the second the road metal is spread first and well rolled in the dry state before the matrix, composed of tarred materials up to 1 inch in size and to the foregoing depth, is applied. This is rolled until the interstices are filled with the matrix and a smooth surface has been obtained. A thin finishing coat of finer tarred materials is usually applied, sprinkled with dry sand or chippings, and rolled until thoroughly hard. The third or Gladwell system is a combination of the first two, having a matrix both above and below the metal.

Rocmac.—Roads made on the Rocmac system are claimed to be dustless, waterproof, economical, durable, and non-slippery. The solution is a chemical composition, made under pressure, the foundation of which is silicate of soda and sugar. The solution is mixed with high-class ¼-inch limestone and gravel free from impurities. This is laid about 1 inch to 1½ inches deep on the road surface, which has been slightly scarified. On this is spread the ordinary macadam metal, about 3 inches thick, and thoroughly rolled until the matrix entirely fills the interstices and comes to the surface. Owing to the simple preparation of the matrix and small plant required, the work can be undertaken by ordinary workmen, but experiments have proved expensive compared with pitch grouting.

In Scotland, as well as England, county road boards that have experimented with tar macadam in constructing new roads and maintenance of old have practically abandoned it, the cost being prohibitive. Tar spraying of 10 to 12 feet in the center is generally regarded as the limit of economical treatment of macadam roads in outlying districts, and this has been restricted to main thoroughfares and of village roads. For suburban roads it is likely that the use of pitch grouting will increase.

A workman who claimed $10,000 from the Toronto Construction Company for the loss of his eyesight as a result of a dynamite explosion, was awarded $1,000 and costs by Judge Champagne in Hull.

The Canadian Northern Railway has completed the grading on the line through the Fraser Valley, and the contractors are now awaiting the arrival of two shipments of steel on the coast to begin tracklaying. The British Columbia section of the system extends through the Yellowhead Pass to Kamloops and down the Fraser Valley to the coast.

Rules of Measurement for Contractors

Suggestive Regulations for Excavating and Concrete Work Adopted at Chicago—The Various Provisions for Extra Work and Deductions

In view of the extent to which concrete is now being used in foundation work and general building construction, the following rules of measurement, which have been adopted by the Chicago Contractors and Masons' Association, the Chicago Architects' Business Association and the Western Society of Engineers, cannot fail to prove of interest:

Excavation of Cellars and Basements.

1. Excavation to be measured and computed by the actual amount of material displaced. If unit price is based upon loose measurement, add forty (40%) per cent. to actual bank measurement, except if consisting of sand and gravel, when only twenty (20%) per cent. will be added. If rehandling becomes necessary, same to be done at a special price agreed upon in addition to the above.

Excavation of Trenches and Pits.

2. Excavation of trenches, pier holes, or pits when more than 3 feet wide to be computed on actual contents when less than 5 feet deep.

When less than 3 feet wide excavation of trenches, pier holes or pits to be computed on actual contents if less than 2 feet deep.

If more than 2 feet deep, compute contents of trench on basis of 3-ft. width, even though same is narrower.

If less than 2 feet in depth, estimate actual width.

For pits and pier holes more than 2 feet deep and less than 12 square feet in area estimate area of same on base of 12 square feet multiplied by depth of same down to 5 feet, and no more than 5 feet deep, estimate on same basis as given below for additional depth of trenches, with the same percentages of increase added.

Add 75 per cent. to actual contents of excavation of trenches, pier holes or pits for depth between 5 feet to 10 feet.

Add 150 per cent. to actual contents of excavation of trenches, pier holes or pits, for depth between 10 feet and 15 feet.

Add 225 per cent. to actual contents of excavation of trenches, pier holes or pits for depth between 15 feet and 20 feet.

Add 300 per cent. to actual contents of excavation of trenches, pier holes or pits for depth between 20 feet and 25 feet.

Add 375 per cent. to actual contents of excavation of trenches, pier holes or pits between 25 and 30 feet in depth.

Add 450 per cent. to actual contents of excavation of trenches, pier holes or pits between 25 and 30 feet in depth, and so on, adding 75 per cent. accumulative for every 5 feet additional depth.

Back Filling and Grading.

3. Soil required for back filling or grading to be measured by computing from cross-sectioning cubic contents of area to be filled or graded.

4. Sheet piling and lagging to be estimated per thousand feet of lumber required. Kind of lumber to be specified.

5. Shortage of earth banks to be done at unit price, per square foot of shored surface of bank.

6. Pumping or bailing when required to be done at special price, in addition to excavation unit price, as the excavation rules are based on dry work; this, however, does not apply to rain or storm water.

Concrete Foundations.

7. Foundations for walls to be measured actual contents when made with square and level off-sets.

Footings with sloping or beveled off-sets less than 30 per cent. from the horizontal multiply area of base by greatest height of footing. This applies to piers also, except when courses in pier foundations are less than 12 feet in area, when 1 cubic foot will be added for each corner for every foot in height of such course.

8. Foundations for all projections, such as chimney breasts, plasters, buttresses, or flues, connected with walls to be measured actual contents contained therein, and 1 cubic foot added thereto for each corner for every foot in height.

9. Recesses and slots in foundations to be measured solid and in addition thereto allow two (2) cubic feet for every foor in height or length.

10. Arches in foundation. Multiply length of chord at spring arch by height from chord to extrados by thickness of arch, and add to the wall measurement. Height of arch ring equal to thickness of wall.

11. Circular or polygon foundations to be figured at double actual contents.

12. For wall 14 feet or less in height, 24 inches or more in thickness, use the actual thickness as basis in computing the volume. For walls less than 24 inches in thickness, add one-half the difference between the actual thickness and 24 inches in computing the volume. If walls are more than 14 feet in height between doors, add to cubic contents fifteen (15) per cent. for every additional 4 feet in height, on accumulative scale, as given for trench excavation.

13. For circular walls of radius sufficiently large to obviate the necessity of using specially prepared lumber for forms, add one-fifth of length to girt wall, and figure cubic contents on the same basis as prescribed for external and division walls, paragraph 12.

14. For battered or sloping walls, estimate contents on same basis as for external and division walls, and add one-half of contents of wedge, or batter to same when narrower on top than 24 inches. See paragraph 12 and 17.

Intersection and division walls, 24 inches thick or less (bonded together in any manner not abutting), to be measured as slot or recess. When thicker, add 1 foot to length of wall for every intersection when measuring.

15. In retaining walls, reinforced with beams, columns or girders, figure concrete casing a minimum thickness of 12 inches from outside edge of steel on side next to earth bank and 6 inches from outside edge of steel on opposite side—i.e., compute wall 1 ft. 6 in. thicker than width of steel.

For all other retaining walls, compute on same basis as for external walls, paragraphs 12 and 17.

No deduction in cubic contents of concrete to be made for metal imbedded in same.

16. Hollow walls to be at special rates.

17. For each corner of wall more or less than 90 deg., add 1 ft. 6 in. to girth length of walls in measuring.

The term corner is used for salient angles of walls, and angle for re-entering angles.

18. All plain projections, such as chimney breasts, piers connected with walls and pilasters, to be measured actual contents contained therein, and 1 cubic foot added for each corner for every foot in height.

19. Independent plain square piers to be measured by

same rule, i.e., add 1 cubic foot for each corner for every foot in height. For plain polygon or round piers, add 4 cubic feet for each foot in height.

20. Recesses and slots to be measured solid in addition thereto allow 2 cubic feet for every foot in height or length.

21. In vaults, multiply length of chord at spring of arch by height from chord to extrados by thickness of arch.

In walls, find contents of arch by same rule and add same to wall measurement, as called for in paragraph 10.

In sewers and tunnel arches, multiply length of extrados by thickness of arch.

Openings with Frames Built In.

22. Deduct contents of windows, doors, and other openings, measuring from jamb to jamb and from top of sill to spring of arch, and add 2 feet of wall for each jamb for every foot in height of opening when plank frames are used; if box frames are used, add 4 feet of wall for each jamb for every foot in height.

Openings Without Frames.

23. Deduct contents of openings, same to be measured from top of sill to spring of arch and shortest distance between concrete jamb for width, and add for each jamb 2 feet of wall for every foot in height of opening.

Circular, oval or other special shaped openings to be figured at special price.

Chimney Breasts, Flues and Pilasters.

24. All flues or hollow in chimneys or walls less than 2 feet in area figure solid and add 2 cubic feet for every foot in height. All flues and hollows in chimneys or walls from 2 feet to 4 feet in area to be measured solid. When larger, deduct one-half of contents of flue.

Detached portions of chimneys in buildings and plain chimney tops above roof to be measured solid, and 1 cubic foot to be added for each corner for every foot in height.

25. Detached chimney stacks to be figured at special rates.

26. No deduction allowed for omissions of concrete for cut stone, terra cotta or other trimmings, bond blocks, timber, joists or lintels.

All ornamental or moulded work in cornices, gutters, belt or sill courses, etc., to be figured at special rates.

27. Cutting and patching of joists, girder, or other holes, slots, panels, recesses, etc., to be paid for on basis of time and material required.

28. When ordered by owner, architect, engineer or the superintendent in charge of the work, to rack or block in consequence of delay of delivery of iron, steel, stone, terra cotta, or other material, that concrete work may connect with such racking or blocking shall be measured as extra work, as follows: Increase girt length of such line by one-half and multiply by thickness of wall.

Concrete Floors on Soil and Tile Arches.

29. Floors to be measured by the superficial surface between outside walls of building. No deductions to be made for floor sleeps, conduits, pipes, drains, division or partition walls. No deduction to be made for any piers, columns, chimney breasts, pilasters or other projections of walls of 10 feet or less in area.

Caissons.

30. Owing to grillage in caissons being left at different heights in same building, unit price for caissons will be computed on excavated contents, including necessary wood-lagging and rings for same. Cubic contents of excavation of caissons to be computed from top of first set of lagging to bottom of caissons and from outside of lagging. If steel or any other special casing is required, same to be paid for additional at special unit price per pound.

31. Area of bottom of bell to be multiplied by height of bell to neck for cubic contents.

32. For caissons 7 feet or more in diameter, estimate actual contents from outside to outside of lagging.

For caissons from 7 to 6 ft. 6 in., inclusive, add 5 per cent. to actual contents.

For caissons under 6 ft. 6 in. to 6 ft., inclusive, add 15 per cent. to actual contents.

For caissons under 6 ft. to 5 ft. 6 in., inclusive, add 25 per cent. to actual contents.

For caissons under 5 ft. 6 in. to 5 ft., inclusive, add 35 per cent. to actual contents.

For caissons under 5 ft., add 50 per cent. to actual contents.

35. If compressed air is required, same to be paid for in addition to the above.

33. If rings are ordered left in caissons, same to be paid for additional at unit prices per pound.

34. Pumping and bulkheading to be paid for at additional price.

35. No deduction to be made for cubic contents of metal imbedded in concrete.

Concrete for filling of caissons to be computed on actual contents per cubic foot of concrete, but no deduction to be made for any metal imbedded in same.

Reinforced Concrete Work.

37. Reinforced walls: Compute concrete on same basis as specified in sections 12 and 17 for external and division walls, and add to same cost of reinforcing metal put in place. If through changes or revisions cutting of reinforcing metal delivered or ordered becomes necessary, estimate the full length of such bars or metal fabric, and add to same cost of cutting and fitting required. Reinforcing metal to be computed on unit price per pound or square foot. No deductions to be made in estimating cubic contents of concrete for any metal imbedded in same, such as wire netting, expanded metal, bars, beams, columns, etc.

Columns.

38. Measuring of plain uniform size column to be covered by the foregoing paragraph 19 relating to piers.

39. Capitals, cap, brackets, panels, moulding or other ornamental or moulded work to be figured special rate.

Girder, Floor Beams or Other Drop Projections Below Floor Slab.

40. For projections named in this paragraph, add for each corner and angle to cubic contents 1 cubic foot for each foot in length. For each chamfered or rounded corner or angle add ½ cu. ft. for each foot in length in addition to the above.

41. Floor and roof slabs to be estimated on same basis as called for in paragraph 29 for floors on soil, and at a minimum thickness of 6 inches. Less than 6 inches in thickness will be computed as 6 inches.

42. No deductions to be made in floor area for opening of less than 20 square feet. For larger openings, after deducting full area of opening, add one superficial foot to floor area for each foot in length of girt of opening, and 1 cubic foot extra for each corner or angle.

43. For pits, baskets or other depressions in floor, add one superficial foot to the area of walls and floor of same for each foot in length of each corner and angle.

44. Setting of fabrics, frames, pipes, sleeves, bolts, rods, clamps, etc., imbedded in concrete to be paid for additional at special price.

Floor Base and Coves.

45. Floor base and coves to be estimated at special price per lineal foot, with 1 foot added to length of same for each corner and angle. For base or cove around round

columns, estimate three times girt of column, and for square or polygon columns, add 1 foot for each corner to girt of same.

46. Concrete stairs to be estimated square foot area of face of treads and risers. Stair landings and platforms between floors to be same unit price per foot as stairs.

47. Curbs and roofs of skylights to be estimated on same basis as called for in sections 40 and 41, except that quantities for same shall be doubled.

48. Sidewalks laid on soil of tile brick arches to be estimated same as floor slab, section 29, with special unit price.

The Strength of Piers or Columns of Different Materials

The diagram herewith shows the compressive strengths of columns or piers of various materials: steel, brick, cement mortar and timber. It brings clearly into view some comparisons well enough known in their fundamental figures but often forgotten. The fact that timber posts are stronger than either brick piers or cement (or concrete) columns appears plainly from the diagram. In a paper on "Fire Waste and Its Prevention," read before the National Association of Mutual Insurance Companies at Peoria, Ill., September 28, 1910, Mr. J. E. Howard, of the Bureau of Standards, the author of this diagram, remarked on it as follows:

The comparative strength of steel columns is given at 30,000 lbs. per square inch, an ordinary strength for structural steel. It may vary from this according to the grade of steel used, lower or higher according to the elastic limit of the metal, and modified by the workmanship.

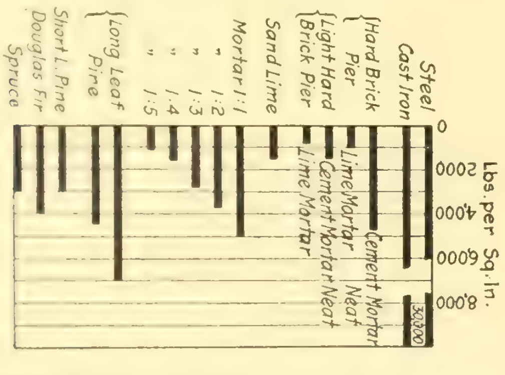

Diagram Showing Compressive Strength of Piers or Columns of Different Structural Materials

The compressive strength of cast-iron columns has been found in the vicinity of 30,000 lbs. per square inch also. This metal occasionally gives higher results and at times lower. The uncertainty of having a sound casting is a source of trouble and detracts from the reliability of cast-iron.

The strength of individual brick greatly exceeds that of brick when laid in piers. This is due largely to the grade of mortar employed. Hard-burned brick frequently range in strength from 15,000 to 20,000 lbs. per square inch when tested singly and an exceptional shale brick was found to possess the phenomenal strength of 38,000 lbs. per square inch. In piers, however, one having a compressive strength of 3,000 lbs. is a very strong one, although when a hard brick is laid in neat cement a resistance between 4,000 and 5,000 lbs. may be displayed. The same grade of brick laid in lime mortar will develop only about 1,500 lbs. per square inch ultimate strength. Light-hard brick show less difference in strength whether laid in neat cement or in lime mortar. They develop lower strength than the harder brick, and being nearer the strength of the lime mortar the cushioning of the mortar is more favorable relatively. Provided the stronger brick could be laid in mortar having nearer the characteristics of the brick, then a much higher strength might reasonably be expected.

Sand-lime brick range in strength from 1,500 to 3,000 or 4,000 lbs. per square inch.

The strength of mortar composed of Portland cement depends upon the richness of the mixture. The diagram illustrates the range which may be expected in mortars from a 1:1 mixture to a mixture containing one part Portland cement to five parts of sand. The rigidities of these mortars are approximately in proportion to their strengths. The strength of concretes is about the same as that of the cement mortars. The addition of the stone has been found not to modify the ultimate strength, over wide ranges. Some examples have shown a slight loss in strength of the concrete over that of the mortar used without the stone, and illustrations of the opposite kind may also be found.

Occasional sticks of long-leaf pine are found which develop the maximum strength plotted on the diagram, but a common strength is in the vicinity of 4,000 lbs. per square inch, while 3,000 lbs. is an ordinary value for short-leaf pine. Douglas fir has generally a compressive strength of about 4,000 lbs. per square inch.

These values are such as may be found, but the wide range in ultimate strength which is displayed by structural materials makes it necessary to consider specifically the properties of those materials which are actually to be used when judging of the strength of any particular structure.

Contractors' Annual Meeting at Windsor, Ont.

At the regular meeting of the Builders' and Contractors' Association of Essex, held on the 7th inst. at Windsor, Ont., the following officers were installed: President, U. F. Dumouchelle; vice-president, T. W. Brooke; treasurer, Robert Parker; recording secretary, G. W. Freeman; financial secretary, Geo. C. Haugh. The occasion was the fourth annual meeting of the association and the members found much cause for gratification at the results obtained since its inception.

After the routine business had been put through, the recording secretary, Mr. G. W. Freeman, read an interesting paper dealing chiefly with the general ethics of the contracting business. "If we cannot place the top stone upon the building," said Mr. Freeman, "it will be ours to lay a firm and deep foundation upon which others may erect a superstructure, and although we work in the basement, others will yet gild the dome." For the promotion of the common weal it was necessary for some to play subordinate parts, but they were all sharing the honor of a great work if they pursued an honorable course in their business and helped to raise the reputation of the trade in general to a higher level. A "square deal" should be the first consideration at all times.

A pleasing departure from the regular business of the association is the provision for social intercourse made by the directors. During the winter months periodical euchre contests have taken place. Refreshments are provided and prizes given, and the events are looked forward to with much pleasure on the part of the members. The membership of the association is between 40 and 50.

A dry dock which will accommodate vessels 700 feet long is now about completed at Port Arthur, Ont., on the north shore of Lake Superior. It was built for the Western Dry Dock & Shipbuilding Company, which at the same time has been erecting a shipbuilding plant around the new basin. The contract for the work, which was begun only last April, was held by the Canadian Stewart Company. We hope to publish a detailed description of this work in an early issue of the Contract Record.

Extensive Deposits of Canadian Marble

Particulars of Important Investigations made recently in the Province of Ontario—Material of Excellent Colour and Texture—A Promising Field

One of the latest papers published by the Canadian Department of Mines is devoted to the geology of the Haliburton and Bancroft areas, in the Province of Ontario. This territory lies several hundred miles north of the central portion of Lake Ontario. Messrs. Frank D. Adams and Alfred E. Barlow, who write the report, give interesting particulars of vast marble beds that seem to promise well. Throughout the area embraced in the report the limestones are found for the most part in a very highly altered condition, being coarsely crystalline, white in color, and usually more or less impure, owing to the presence of grains or scales of certain silicates. These silicates occur not only disseminated through the rock, but are often especially abundant along certain lines or bands, thus giving to the limestone a foliated or stratiform appearance.

The investigations show conclusively that the coarsely crystalline Laurentian limestones or marbles were originally fine-grained limestones of a bluish or drab color, similar to those seen in the more recent sedimentary deposits, but which, by the forces of metamorphism, have been so completely altered that, except in some few places, all traces of their original character have been completely obliterated. The coarsely crystalline varieties of these rocks are by far the most abundant. In these the calcite individuals usually have a diameter of from 2 to 7 millimeters. In some localities, as in the townships of Glamorgan and Cardiff, the constituent calcite grains measure from 2 in. to 3 in. in diameter. In color, these coarsely crystalline limestones, when free from silicates, are usually white. In some localities, however, they have a pinkish, and in others a salmon, color. Large bodies of limestone having the former color occur along the shores of Salmon Lake in the township of Limerick; while in the township of Minden there are great bodies of limestone of the latter tint, forming a very handsome rock. These colors are not due to the presence of any foreign material, but belong to the calcite itself.

The limestones in some parts of the area are almost free from the silicates and other minerals which are usually present in them, and form great bodies of pure marble. This is usually too coarse in grain to permit of its being used for the purposes for which the best qualities of marble are employed, a fine saccharoidal texture being seldom seen, but nevertheless in many localities marbles of good quality could be obtained, which would make beautiful building stone and would serve the purposes for which marble is ordinarily employed. Some years since a small quarry was opened in the township of Glamorgan, near the line of the Irondale, Bancroft & Ottawa Railway, and some marble taken out which was used for tombstones, several of which may now be seen in the cemetery at Gelert. The stone has a good appearance, being pure white in color, but rather coarse in grain. A great development of nearly pure marble is found in the same township, to the south of Contau Lake, where it is excellently exposed along the Kinmount Road. There is also a large body of this marble exposed on the shores of the western half of Deer Lake, in the township of Cavendish. The exposures are very extensive, especially about the northern end of the lake, where the rock has a well-bedded appearance, the beds being nearly vertical. Great bodies of marble, which is usually fairly pure and which in many places contains very little foreign material, are found forming the shores of Jack Lake in northern Methuen, and extending across into the adjacent township of Burleigh, in the southeastern portion of which the occurrences are very large. Another large body is found in the township of Anson.

Limestone in Cardiff.

Affording a marked contrast to the rock from the localities of the above mentioned, is an occurrence of limestone in the township of Cardiff. Here the rock is developed in places as a beautiful cream-colored alabaster, which is so fine in grain that its crystalline character can only be recognised under the microscope. This rock was supposed by the residents in the vicinity to be gypsum, but is in reality a very fine-grained limestone. It contains in places large twisted individuals of calcite as if the structure were due to cataclastic action.

Opportunities and Prospects.

Only a few places have been opened as yet for ornamental stone throughout this area, but Messrs. Adams and Barlow say that the examinations they made were sufficient to show that marbles of various colors and textures, equal to the best imported material, could be obtained in the region. Large blocks, free from flaws and shakes, suitable for columns of any size, can be quarried, and as transportation facilities are adequate, the stone could be put on the market in large centres, such as Toronto, Ottawa, and Montreal, at prices much lower than those obtained from imported marble. In Faraday township a great deal of work has been done in opening up a marble quarry, on the northern edge of the area of crystalline limestone immediately south of the extensive body of nepheline syenite near Bancroft. The presence of good, workable marble has here been proved, by pits and strippings, over an area of more than half a mile long by some 1,000 feet wide. Stone can be obtained ranging from a coarse crystalline white marble to a greyish, dove colored, fine-grained stone; variegated and veined marbles have also been uncovered in places by removal of the drift. At the main working place of this quarry a wide dike of igneous rock has slightly disturbed the beds, but nevertheless some very large blocks have been extracted; some of these, which were lying on the floor of the quarry, weighed up to twent ytons or more, without any apparent serious flaws. In other parts of the ridge the beds are lying in a very favorable position for working, the dip being slight.

City Engineer Ker favors McGregor's Lake as a source of water supply for the city of Ottawa, and recommends an early start on the project. Mr. Allan Hazen, of New York, is also in favor of this scheme.

Mr. Frederick L. Olmstead, of Boston, the landscape expert, has submitted to the Quebec government important recommendations for the development of the city of Montreal, the improvement of its transit service and the opening of new thoroughfares. The Montreal Parks Commission is in favor ot Mr. Olmstead's report and does not think that the cost of carrying out his suggestions would be prohibitive.

The city of Montreal will spend $1,000,000 on permanent street work this year in addition to $500,000 for sidewalks.

Winnipeg's Great Preparations

Planning to Expend Huge Sums — Manitoba Power Company's Important Projects — The Supply Market

Office of the Contract Record,
Winnipeg, Feb. 17, 1911

The coming construction season for Winnipeg and vicinity promises to be one of more than usual interest to contractors, material men and supply houses. There is a tremendous amount of work in sight and the next month will see the completion of plans which mean the expenditure of huge sums. While it is impossible to predict what the labor situation will bring forth, it is safe to assume that there will be some difficulty in securing sufficient labor to carry on the work in hand as rapidly as will be desired.

Though active work will not begin until April, there is already sufficient work in preparation for the new Agricultural College, which will amount to approximately $1,000,000; the Dominion government is planning to remove the drill hall at Fort Osborne to a new site and construct a modern rifle range outside the city limits; a new court house and parliament buildings with a residence for the Lieutenant-Governor are under discussion; while the University of Manitoba is trying to arrange for the financing of its new site to the southwest of the city. These are all government projects.

The three big railway systems have planned for work which will make a heavy draft on the supplies of unskilled labor. The Hudson's Bay railway will be started, the Winnipeg Electric has a number of extensions to make, including a new power house, and the Manitoba Power Company will start work on its hydro-electric plant, transmission lines and rural railways. Two large bank buildings are now in progress and the contracts for a third will be let shortly. The city of Winnipeg will push consrtuction on its hydro-electric plant, transformer stations and distributing system, which it is expected will be in readiness by July 1. In addition to these the city has a tremendous amount of local improvements in hand. The school board has two buildings under construction and others are being planned.

These alone would mean a busy season in the building trades, but the work on residential property is expected to total as much as all of the corporation and municipal work in the city. Many sales have been recorded within the last fortnight, and the purchasers have placed orders with their architects for plans.

Supply Firms Getting Busy.

Material men are getting in shape to meet the demand, which will begin early because of the amount of preparatory work done last fall. This year will see a large amount of sand and stone brought from Lake Winnipeg district, the opening of the St. Andrews locks making this source of supply readily available. In the Tyndall, Stony Mountain and Stonewall districts the quarry owners are putting their plants in shape for a heavy production, and the brick yards are stacking wood for a big season. Money is comparatively easy for all legitimate enterprises so that this phase of the situation is giving little anxiety.

The Manitoba Rolling Mills Company, St. Boniface, Man., is planning for an enlargement of their business this spring. They propose to go into steel work and will construct the necessary plant on their present site. They will produce small bars and reinforcing rods, rolling them from pig and scrap. There is a large market for this class of material available and they will put in at least four furnaces and two trains of rolls, practically doubling their present plant.

The erecting equipment for the new steel bridge across the Assiniboine river at Winnipeg is now on the ground and work will be started at once. It will give access to the Union Depot from the south.

Plans are now in hand for the combined C. N. R. and G. T. P. viaduct across the south end of Main street, Winnipeg, and it is expected that they will be submitted to the Railway Commission and city council at an early date. It is the intention to leave headroom of 14 feet 6 inches for street car traffic, and it is proposed to raise the level of the present C. N. R. main line so as to give a free roadway across the Norwood bridge to St. Boniface, where there is now a heavy traffic. It is also reported that the Great Northern will come in to the Union Depot over this same line and that an agreement to this effect will shortly be signed. This means that the Great Northern will start work at once on their line from the United States boundary to Winnipeg. They already own a large site in the centre of the city which it is reported will be used for freight purposes.

A group of contractors, of whom J. D. McArthur is one, have secured the contract for a 70-mile extension northward of the Algoma Central, the work to be completed this season. A number of sub-contractors have been called in and are working on the plans.

Manitoba Power Company's Important Projects.

Within the next two or three months the E. B. Reese Engineering Company, Winnipeg, will be in the field for a large amount of central station and other electrical equipment. This company, of which Mr. E. B. Reese is the chief, is the present representative in Winnipeg of the Manitoba Power Company, a group of Montreal capitalists.

A contract has been secured to supply the city of St. Boniface with electrical energy, which the municipality will in turn retail to consumers as well as supply its own needs. At present the municipality uses about 3,000 horsepower and it is expected that with the rates secured they will be in a position to compete directly with the Winnipeg Electric Street Railway Company to supply various large industries which now secure their energy from other sources. Special inducements will be offered manufacturers to locate there and the power will be supplied at cost, laid down.

In addition to this contract the Manitoba Power Company is negotiating for a number of franchises in the province with the intention of operating along the lines of the Ontario Hydro-Electric Commission—that is, to supply small towns and villages and individual consumers along their transmission lines. Negotiations are now in progress for permission to run a line of electric railways through the municipality of St. Vital, and this line will ultimately be continued through to the North Dakota boundary, serving a rich and well-settled country.

The Manitoba Power Company has also acquired the various charters held by the Rural Railways Company, and it is the intention to develop these, giving a wide and complete system of radiating railways out from Winnipeg.

Though the plans have not yet been completed for the development they have advanced to a stage where a general idea is possible. The company has secured from the Dominion government the rights to develop Big Bonnet, or Great Falls as it is sometimes called, on the Winnipeg river. The initial development will be 21,500 k.w., but this will be increased with the demand to the full capacity of the falls, 75,000 h.p. The first system will call for about 300 miles of high tension transmision lines, probably carrying current at 120,000 volts, three-phase and thirty cycles. The high tension wires will be carried on bridge type towers of a modified design especially suited to the nature of the country to be crossed.

In the distribution, the high voltage will be tapped off at three or more substations, being sent out at a voltage of 13,-

000 on the radiating distribution system. The voltage supplied to St. Boniface has been contracted for at 2,200 volts, 60 cycles. Low voltage current will be supplied to small consumers in the agricultural districts.

A feature of the contract with St. Boniface lies in the fact that energy must be delivered to them by November 1, 1912, and a bond of $250,000 will be entered into for the completion of the contract.

In order to fulfil the terms of the contract and save the forfeiting of their bond the company must use all haste in the completion of their plant and nothing will be permitted to stand in the way. At the power site there is a considerable amount of granite rock to be removed and a dam about 18 feet in height is to be erected. Ready access to the work is possible, for the company has secured the charter for a short line which will run from Lac du Bonnet station on the C. P. R. immediately to the site. In consequence there will be no trouble in transporting material and supplies.

L. H. S.

Edmonton Builders Declare Open Shop

At a recent meeting of the Edmonton Builders' Exchange it was decided to declare open shop on May 1st. The following is a copy of the final letter sent to the unions:

"That whereas it is the firm conviction of this exchange that the agreement formerly existing between the general contractors' association of this exchange and your union, has been annulled through violations, and further, whereas other unions having declared their determination not to enter into any further agreements with the exchange, thereby making said agreements not workable, as instanced during the several strikes of 1910 when members of your union refused to work, the Edmonton Builders' Exchange declares in behalf of its affiliated associations for open shop in all building trades except those of the Bricklayers' and Laborers' Unions, which latter had in their agreement the necessary non-sympathetic strike clause."

To Other Unions Interested.

"The Edmonton Builders' Exchange with all affiliated associations, having unanimously declared in favor of the open shop for all building trades, except that of the Bricklayers and Laborers' Unions, which latter have in their agreement the necessary non-sympathetic strike clauses, you are hereby respectfully advised that there will be no further agreements signed between your union and either the Edmonton Builders' Exchange or any of their affiliated associations. This ruling to go into effect May 1st."

Herewith is attached the maximum scale of wages decided upon by the several associations, and ratified by the monton Builders' Exchange.

	Per hour.
Bricklayers	67½
Carpenters	[illegible]
Electricians	50
Laborers	35
Lathers (per day)	3.00
Metal lathers	50
Painters	50
Plumbers	60
Plasterers	70
Hod carriers	35
Mortar mixers	[illegible]
Stone cutters	65
Sheet metal workers	55
Structural steel workers	[illegible]

The official letters to the several unions were signed by President [illegible], of the Edmonton Builders' Exchange, and [illegible], secretary-treasurer of the Edmonton Builders' Exchange.

Paving Work at Victoria, B. C.

The city council of Victoria, B.C., have decided that hereafter tenderers for asphalt pavements must be prepared to bid on a standard concrete base instead of, as heretofore, permitting the companies to tender not only on a standard pavement but also to submit tenders on pavements in which a base of other materials was intended to be used. The result of such action will bar companies such as the Worswick, Bitulithic and others which use a base composed of sand gravel and bitumen or asphalt, unless they tender on the standard concrete base.

The decision was arrived at during the consideration of the general conditions under which contract work must be carried out this year. After setting forth the respective duties of contractors and the city engineer relative to plant, tools, indemnity, proportions of materials to be used, patents, etc., the engagement of local labor as far as possible and the exclusion of Oriental labor, the fixing of a minimum wage of 34½ cents per hour for an eight hour day, the placing of the city engineer in supreme charge and control and regulations as to time limits, penalties, etc., the council passed the following section, but only after a lengthy discussion:

> "A standard base of cement concrete must be used in connection with all pavements of an asphaltic nature. The concrete foundation or base will be four inches thick for light traffic and five inches thick for heavy traffic. The concrete shall consist of one part cement to three parts of sand, and five parts of gravel or broken stone thoroughly mixed. The materials of each class must be submitted to the engineer and the quality thereof approved of in writing by the city engineer before used.
>
> "Upon this base is to be placed a wearing surface of an asphaltic nature. The contractor in case of alternative bids will be expected to furnish his own specifications which will be subject to the approval of the city engineer. In no case will the wearing surface be less than two inches, and samples of the pavement shall accompany each tender. The form of tender will show the thickness of cement base required."

Under the above section the contractor will not be prevented from bidding upon the class of wearing surface he sees fit but he must make his own specifications for a wearing surface and shall fully describe the difference between the alternative pavement and the standard pavement. The specifications for the standard wearing surface will be prepared later by the city engineer.

The unit basis of work will also be adopted, that is the contractor will be paid a fixed price per square yard of pavement, per lineal cubic yard of earth excavation and per cubic yard of rock excavation.

The tenderer must leave fifteen per cent. of the contract price with the city for ten years as a guarantee that he will maintain the pavement in good condition and give a bond for twenty-five per cent. of the amount of his contract for a period of five years as a guarantee of maintenance.

The Ontario Government is introducing a new bill looking to the protection of workmen employed in building construction. Special provision is made against unsafe scaffolding, and there are a number of regulations provided for railings on scaffoldings and the planking of floors. The penalty for any infringement is fixed at $500. The regulations will not make any difference in Toronto as the city [illegible]

The [illegible] Bridge Company are applying to the legislature for authority to construct a bridge over the St. John River between [illegible] and [illegible], Me.

With a view to prohibiting the [illegible], the [illegible] Building Inspector [illegible] to make a special report

Notes on Railroad Development

Increasing Activity in the West—Unprecedented Demand for Labor Expected—C. P. R. Plans for Toronto

A project is under consideration by several capitalists of Vancouver, B.C., for constructing a railway to the crest of Grouse Mountain, which is situated about 12 miles from Vancouver. Mr. H. C. Miles, Vancouver, is interested.

Contracts have been let and work started on clearing the townsite of Port Mann, which is to be made the Canadian Northern Railway's Pacific terminal. Four thousand acres, with a water frontage of 2½ miles, have been surveyed, and nearly 1,000 men are engaged upon the work of laying out the townsite, which will be completed within four months. The town is situated on the south bank of the Fraser River, a little east of New Westminster, B.C. The river at this point is over one mile wide, and there is a depth of 40 feet of fresh water at the docks.

It has been announced by the Minister of Public Works that the matter is seriously under consideration of having surveys made for the projected tunnel under Northumberland Straits between Prince Edward Island and the mainland. The distance at the most narrow part of the Straits is nine miles.

On February 1st the steel of the Grand Trunk Pacific Railway had been laid to Prairie Creek, a distance of about 55 miles from Edson, Alta., or 185 miles west of Edomonton, where the track will end until such time as the bridge over Prairie creek has been completed. As soon as this is done the laying of the steel will be resumed and probably carried on as far as the Athabasca river, where another bridge has to be constructed.

The Street Railway Commission of the city of Guelph, Ont., has received tenders for the construction of the new branch of the railway to be built in St. Patrick's Ward. Construction will commence as soon as the snow is off the ground.

Extensive construction work is under way at Prince Rupert, B.C. In the business section of the city, public work to the extent of nearly $500,000 is under way. Street grading on the Grand Trunk Pacific calls for much heavy work. On First, Second and Third avenues, near the water front, the rocky bluffs are being dynamited, and the deep fills brought up to grade. Railway construction is advancing rapidly. For more than 100 miles supply trains are operating, and from Kitselas to Hazelton, at least 60 per cent. of the grade is in excellent shape. By spring there will be a passenger and freight service from here to Kitselas. Permanent tracks are being laid in the Prince Rupert yards and temporary terminal facilities are being built.

Press reports quote P. Welch as stating that between 1,000 and 3,500 men will be engaged in construction work on the G. T. P. by the firm of Foley, Welch & Stewart, of St. Paul, Minn., which has the contract for the building of the road as far west as Tete Jaune Cache. Mr. Welch recently returned to Edmonton, Alta., from the west, after a trip as far as the head of the steel, near Prairie Creek.

It is now reported in Prince Rupert that the Grand Trunk Pacific may not be the only railway having a terminal within its gates. The Mackenzie & Mann syndicate is credited with the intention to construct and operate a line to Prince Rupert. At the present time and for some considerable time past the Mackenzie-Mann syndicate has had surveyors and prospectors in the field to the north of Kalen Island, and it is currently reported that one of their next announcements will be that they are going to invade Prince Rupert from the north. From the Portland Canal they are at present constructing a line eastward and they are also credited with being behind the company ostensibly owning the surveyed road from Stewart down in the direction of Port Simpson.

According to a despatch from Victoria, B.C., active work has been commenced on the Vancouver Island section of the Canadian Northern Pacific Railway. A store and general depot have been established to form a base of supplies, and a branch camp is now in course of construction at Peddar Bay. From Peddar Bay construction will be carried on in both directions, while other camps will be established along the route. The contractors are willing to sub-let the contract for the second twenty miles of the railroad, but as there is three feet of snow on the route running from Sooke to Shawnigan Lake, construction will be impossible there for some time. Sixteen sub-contractors have been over the second twenty miles and are ready to tender. The sub-contractors will not only clear the right of way, but will also complete the construction work. As there are no formidable difficulties in the first forty miles it is confidently anticipated that rails will be laid over this portion by the end of the year.

It is stated that there will be an unprecedented demand for labor in Western Canada this year, particularly in railroad work. It is estimated that 7,000 men will be needed at Edmonton, where the Canadian Northern will carry out extensive work. The main line will extend from Ste. Anne west to the mountains, and on that stretch of road it is expected that the contractors will have grading outfits stretched all along the line before the construction work is far advanced. On the C. N. R. branch lines a large number of men will be required for the completion of the Landing line, the construction of the Strathcona cut-off and the completion of the Vegreville-Calgary line. A big piece of work is also to be done on the Morinville-Battleford line, east of Morinville.

C. P. R. to Spend Millions in Toronto

Mr. David McNichol, vice-president and general manager of the C. P. R., is authority for some interesting details of the company's extensive plans for Toronto.

A large office building will be erected for occupation by the Dominion Express Company on the Government House site at the corner of King and Simcoe streets. Inside of the King street walls of the freight yards will be a driveway thirty feet wide, lighted from the street. A park will extend from the western end of the Government House property on King street.

The proposed viaduct from Summerhill avenue to Poplar Plains road and the new station just east of Yonge street, North Toronto, will cost from $500,000 to $630,000. Plans for the new ticket office at the corner of King and Yonge streets are not completed, but the buliding will be thirteen to fifteen stories high. A new union station will be constructed whether a viaduct is built or not. The whole scheme involves a total expenditure of $5,000,000.

Municipal Activity at Calgary, Alta.

The city council of Calgary, Alta., have approved of submitting the following by-laws at a special election to be held in the course of a few weeks: $75,000, fire station; $120,000, two incinerators; $20,000, street paving plant; $40,000, sewer connections; $60,000, conduit system; $245,000, waterworks extensions; $380,000, electric light extensions.

In addition to these, some $256,000 has already been voted for waterworks extensions and $484,000 for street railway extensions during the coming summer. By-laws are also being prepared for a large trunk sewer and for lateral

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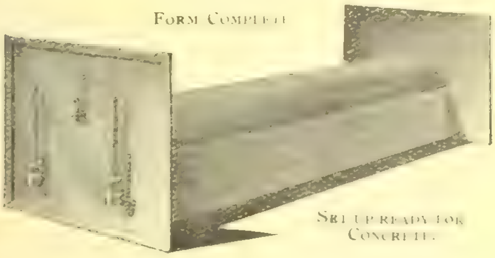

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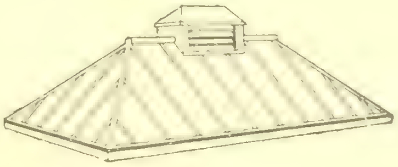

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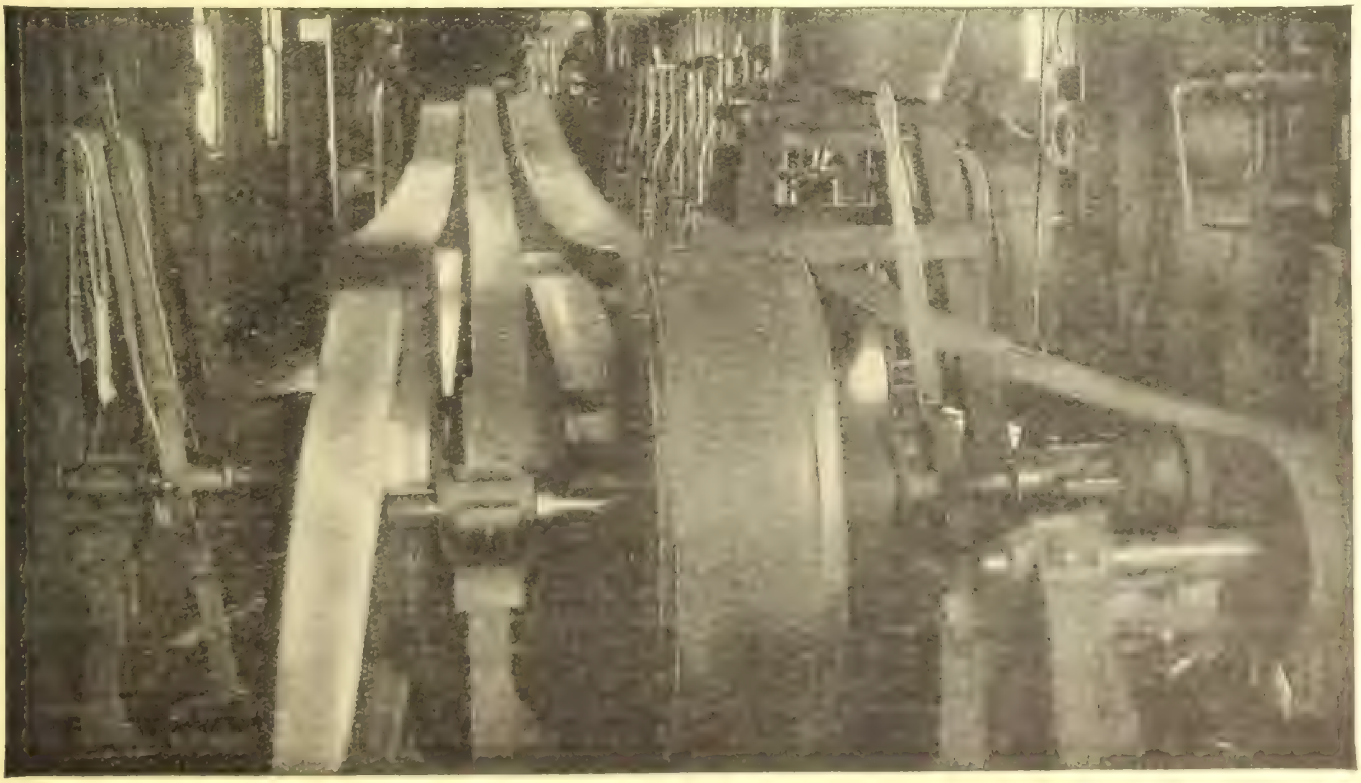

SCANDINAVIA BELTING

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extensions. This will cost about $500,000. A new isolation hospital, and municipal store house and machine shop are additional projects, according to information furnished by Mr. A. G. Graves, city commissioner.

Personal Mention

City Engineer Rust, Toronto, has appointed Mr. J. Race to take charge of the laboratory work at the filtration plant.

The death occurred recently in Calgary, Alta, of Mr. Wm. Garson, the contractor for the new post office at Strathcona, Alta.

Messrs. E. R. Dennis, Geo. S. Gould, A. C. Nobbs, W. T. Brown and J. Jones were among the London, Ont., delegates to the C. N. A. B. convention at Winnipeg last week.

The special committee of the Winnipeg city council is busy on a revision of the building by-laws. Building Inspector Rodgers and Messrs. W. Fingland and J. D. Atcheson, architects, are associated with the council in this work.

The town council of Souris, Man., has engaged the services of Mr. V. H. Williams, as resident engineer, to superintend the construction of the waterworks system. Mr. Williams is at present assistant to the C. P. R. engineer resident at Souris.

Messrs. Hamel and Tessier, of Quebec, have entered into partnership as consulting civil engineers and have taken an office in the Hochelaga Bank Building in that city. For the last two years Mr. Hamel has been in the employ of the Quebec bridge engineers.

Mr. A. B. Wilson, who has been connected with the Tungstolier Company, Conneaut, Ohio, for the past two years as their St. Louis representative, has been made vice-president and general manager of the Tungstolier Company of Canada, Limited, with offices at Toronto.

Mr. R. G. Saunders has been appointed assistant city Engineer of Moose Jaw, Sask. Mr. Saunders was in the Toronto Water Works Department before going to Moose Jaw last year and his many friends will be glad to learn of his success.

Messrs. Powers & Brewer, contractors, Grand Falls, N.B., have completed the installation of a modern system of waterworks at that place. The work was carried out under the supervision of Mr. Edward Powers. This firm has also finished a contract for the C. P. R. a few miles out of Grand Falls

Mr. Allan Hazen, of New York, the consulting engineer on the filtration plant at Toronto, advises that city to economize the water supply and put meters on all the water services, at a cost of $800,000. At the present rate, he says, it will be necessary to spend $5,000,000 on extensions during the next few years and to dig a new tunnel under the Bay.

At the annual convention of the Western Ontario Clay Products Association held recently at Chatham, Ont., the following officers were elected for 1911: President, John Wardell, Blenheim, Ont.; 1st vice-president, A. Davenport; 2nd vice-president, D. Martin, Thamesville, Ont.; secretary-treasurer, A. Wehlann, Cairo. The association decided to meet at the same time and place next year.

City Engineer Smith, of Victoria, B.C., is looking for an expert in asphalt paving. Recently the city council decided that an expert should be engaged to inspect the work of paving contractors, and see that the city is getting the best material and work. With some 21 miles of pavement passed last year, but not yet commenced, and many more works to be passed this year, the whole to date aggregating something less than $2,000,000 in cost, the necessity for a close civic inspection of the work is apparent.

In the action which Mr. E. J. Lennox, architect, is bringing against the city of Toronto, in which he is claiming $208,000 for services in connection with the erection of the city hall, the city has put in a counter-claim for $150,000 for extra cost of masonry and stone work which Mr. Lennox is alleged to have had done without authority. When the case come up for hearing it will in all probabilty last several days, as it not only involves the large amount of $208,000, but will require an enormous amount of detailed investigation. The statement of claim takes up about 34 or 35 pages of typewritten foolscap.

Mr. J. G. Sullivan, assistant engineer of the Canadian Pacific Railway in Montreal, who, at the time of the death of the chief engineer of the company, the late J. E. Schwitzer, was under appointment to go to Winnipeg as assistant chief engineer, has left Montreal for the West, and will immediately assume his new duties there. Mr. Sullivan was named to go to Winnipeg when Mr. Schwitzer was made chief engineer. It was thought that there might be some change as the result of the death of the chief engineer, but it has now been decided to carry out the former plan. A sketch of Mr. Sullivan's career was published in our issue of January 18.

Mr. J. G. Sullivan, now of Winnipeg, Assistant Chiet Engineer, C. P. R.

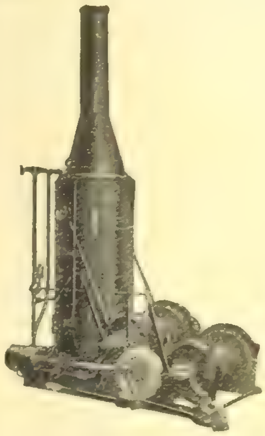
Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, encloing stamped envelope, and stating number of enquiry.

163. **Fire escape landings, etc.**—An English manufacturer of fire escape landings and ladders for outide mills and public buildings, would like to be placed in correspondence with Canadian importers.

165. **Agents.**—An English firm manufacturing stone-breaking machinery, concrete block machines and concrete mixers, screens, elevators and conveyors, etc., are open to appoint reliable Canadian agents.

169. **Agents.**—A Scottish company manufacturing paints, oils, colors and varnishes, would like to get into communication with manufacturers' agents in various parts of the Dominion prepared to represent them on a commission basis.



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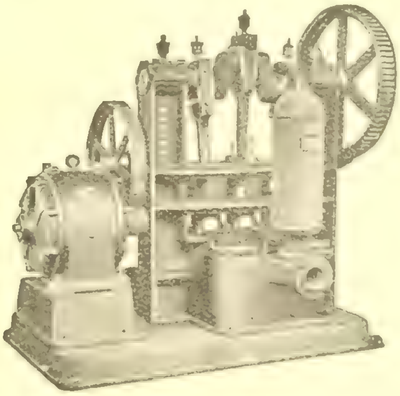

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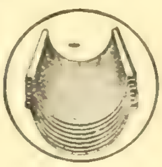


This compactness saves freight and makes it easy to handle them. You put the sections together like this:

Then you clamp the flanges together like this:

And you've got a piping that will outlast anything of the kind there is. Better get the book and sample and study it.

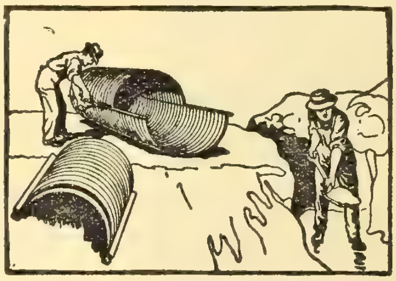
G. H. Pedlar

GET your township reeve or warden to study Pedlar Culverts. Send for the Free Book and show him why this Culvert surpasses for all ditch drainage, for restraining small streams, for every use that any culvert can serve. You will profit through lowered taxes, better roads and abolished washouts. Send for the book and interest your township's officials. You will benefit by what they will learn.

For a very moderate cost you can instal a perfect sewage-disposal system on your farm, using a suitably-sized Pedlar Culvert. You can realize the full value of the liquid manure your animals produce by draining your stable floors with Pedlar Culvert—and that highly valuable manure is usually wasted on farms. Pedlar Culvert makes it easy to water your cattle in winter. And there are a score of other uses for it on the farm.

Nothing vies with Pedlar Culvert as a well-curbing or a cistern lining. The thick galvanizing absolutely protects the metal of these Culverts from rust or corrosion, and the metal itself protects the water supply from contamination. For draining swampy spots around the farm, or for irrigation ditches and under-drains Pedlar Culverts far excel tile or cement piping, are much less costly, much easier to instal and infinitely more durable.

Pedlar Culvert is made in every standard size from 8 to 72 inches diameter, of Special Billet Iron of the the best quality, in extra heavy gauge. This Billet Iron is curved into semi-cylinders—curved while cold, so the sizes never vary a fraction. These half-cylinders are then corrugated by a pressure of sixty tons to the square inch. After being corrugated, the whole surface and each edge is heavily galvanized and made positively rust-proof.



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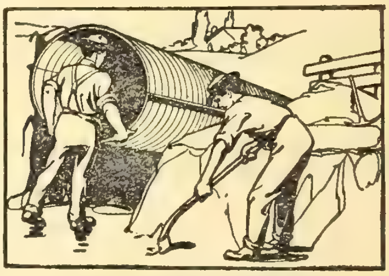

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is made in Nestable Sections from the Best Billet Iron, heavily galvanized and deeply corrugated.

It is the simplest kind of work to put these half-sections of Pedlar Culvert together permanently. One half-cylinder is placed on another, and the flange-rib on each side is rigidly compressed flat by the huge pressure exerted by a simple but effective tool. No bolts, no rivets, no makeshifts—but a triple-thick locking rib-flange that gives Pedlar Culvert immense strength. Thus it will stand crushing strains that would destroy any other piping.

This peculiar flat-flange, triple-thick rib makes the most perfect joint possible—nearly as good as if it were welded. Yet it allows for expansion and contraction under heat or cold. Thus a Pedlar Culvert will not spring nor split even though frozen solidly full of ice. Also the triple rib flange principle makes it possible to break joints in putting this Culvert together, something you cannot do with any other culvert or with cement piping or tile.

Pedlar Culverts are the most portable, as well as the most durable of any piping for any purpose. Being made in half cylinders, they are nestable—so that a great many linear feet of culvert occupy but few cubic feet of car or wagon space. This economizes freight and carriage costs, and makes it easy to transport this Culvert even in rough country. You should get the free book and sample culvert that makes the whole story clear. State your possible needs when you write for the book, and let us quote prices.

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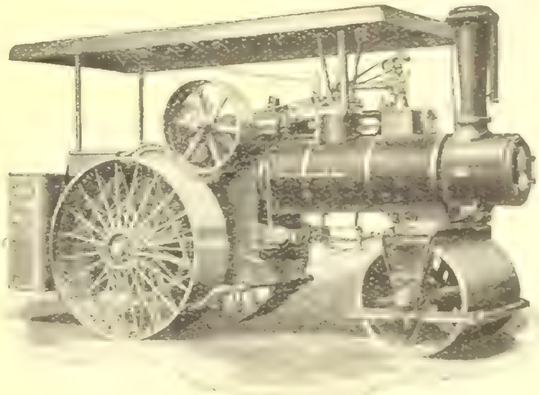

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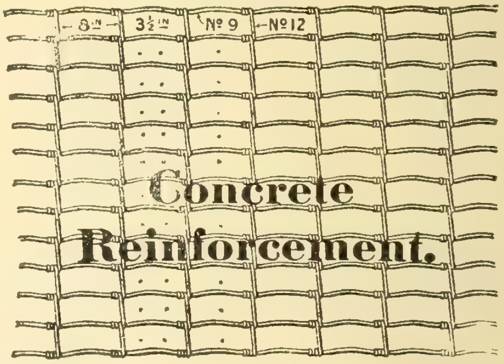

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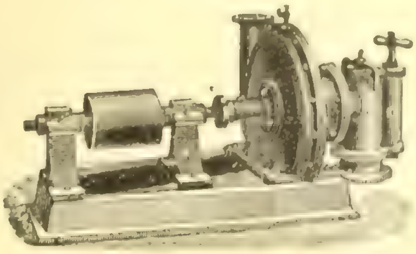

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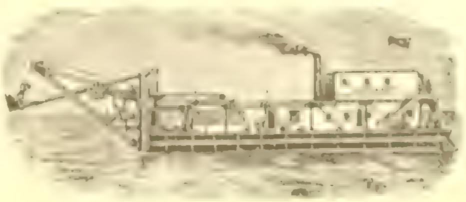

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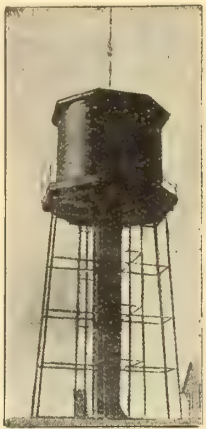

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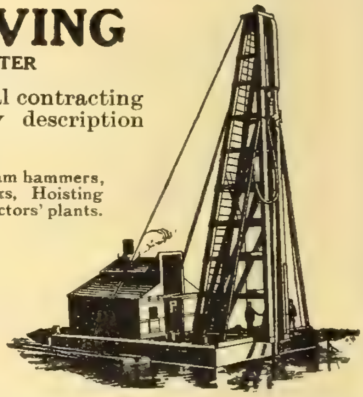

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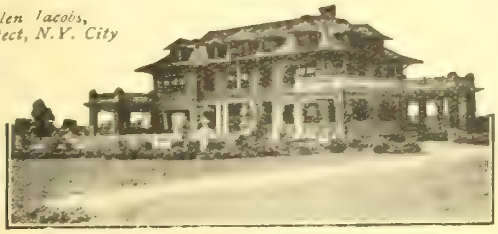

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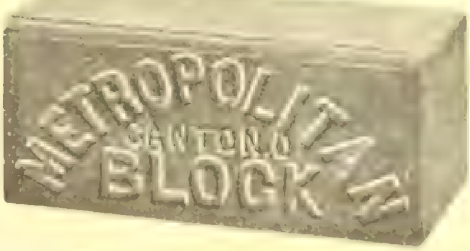

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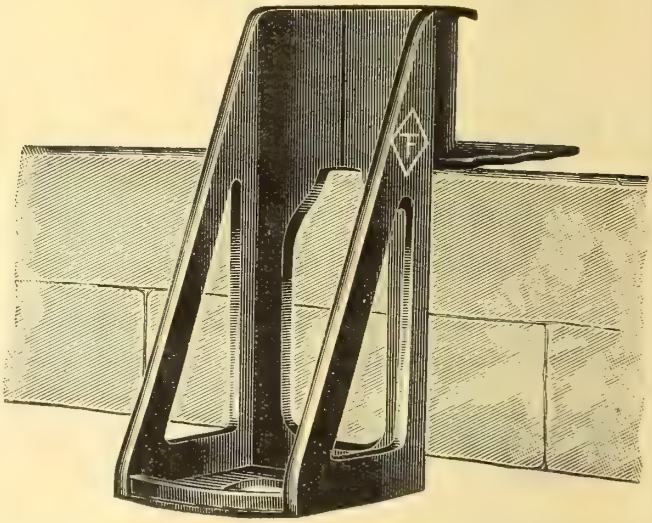

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Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.
Vitreous Tile—All sizes, according to color, 55 to 65 cents.
Glazed—White, 6 x 3 inches, 55 cents per square foot.
Matt—Dull finish colors, first, 70 cents.
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Opalite Tile—3-16 inch No. 1 standard, size 6 x 3 inches, 6 x 2 inches, 60 cents.
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Standard compression work, 65 per cent.

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Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 70 per cent.; roundway, 65 per cent.

No. 4 compression bath cock	net $1.65
No. 4½ Fuller's	net 2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers Galvanized Iron Range.

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks.

16 x 24, $1.00, 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb., traps and bends, 50 per cent

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2⅛ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.
Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings.

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.
7 and 8-inch pipe, 50 per cent.
Light pipe, 60 per cent.; fittings, 70 and 10 per cent.

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Cement, car lots, f.o.b. Toronto, bags extra, $1.70
Crushed stone, $1.25 per ton, f.o.b. Toronto.
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Burnt River rubble stone delivered, $14 to $15 per toise.
Free stone delivered, 14 to $15 per toise.
Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
Brown sills and beads, in the rough, delivered, 35 cents per foot.
Rubble stone in car lots, $1.25 to $1.30 per ton
Scotch fire brick, delivered, $30 to $35 per M.
Steel channels and beams, $2.60 per 100 pounds, delivered f.o.b. Toronto.
Expanded Metal, No. 10 gauge, 3½ cents per square foot.
Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.
Lime, per cwt., delivered, 38 cents.
Plaster of Paris, per barrel, delivered, $2.20.
Manilla Rope, best, per pound, 15 cents.

PAINTS AND OILS.
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Pure White Lead, ground in oil, $6.00 to $6.25 per 100 lbs.
Pure XX Zinc White, ground in oil, $8.00 to $9.50 per 100 lbs.
Pure Florence Green, ground in oil, $12.50 to $13.50 per 100 lbs.
Boiled Linseed Oil, in barrels, $1.15 per gallon of 9 lbs.
Raw Linseed Oil, in barrels, $1.12 per gallon of 9 lbs.
Turpentine, in barrels, $1.05 per gallon.
Pure Linseed Oil Putty, 25-lb. tins, $3.75 per 100 lbs.
Pure Linseed Oil Putty, bulk, in barrels, $3.25 per 100 lbs.
Pure Red Lead, dry, $5.00 to $6.00 per 100 lbs.

G. Salvas & Cie, contractors, Montreal, are reported to have dissolved.

Johnson & McKenzie, plumbers, Picton, Ont., are reported to have assigned.

Lapointe & Pilon, lumber merchants, Montreal; H. T. Lapointe and J. C. Pilon, have registered.

D. C. Baird, manufacturer of boxes, St. Mary's Ont., is advertising business for sale, it is reported.

Rev. F. E. Oberlander, of St. Peter's Lutheran Church, has announced tentative plans for a tuberculosis sanitarium in Waterloo county.

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[illegible]

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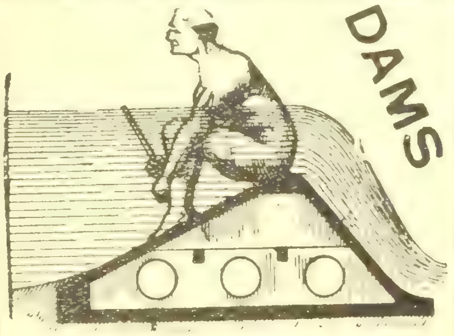

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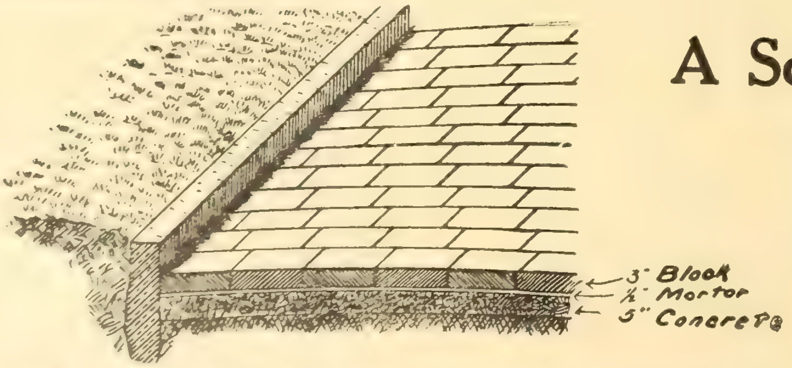

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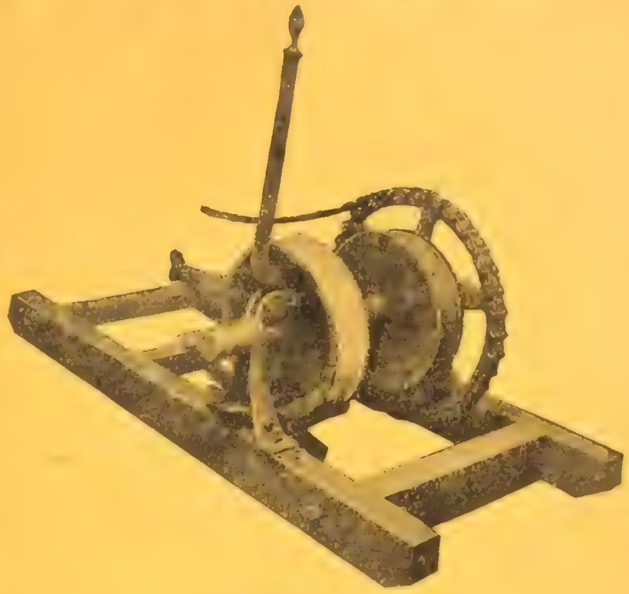

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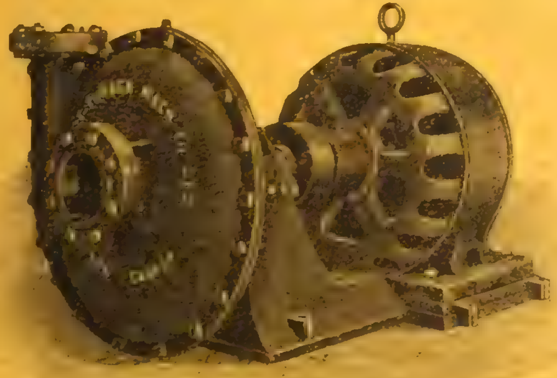

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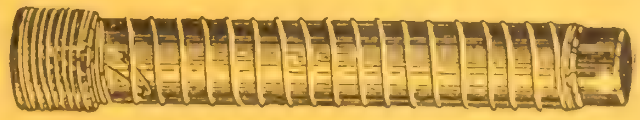

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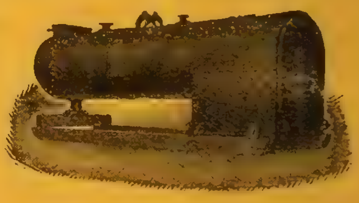

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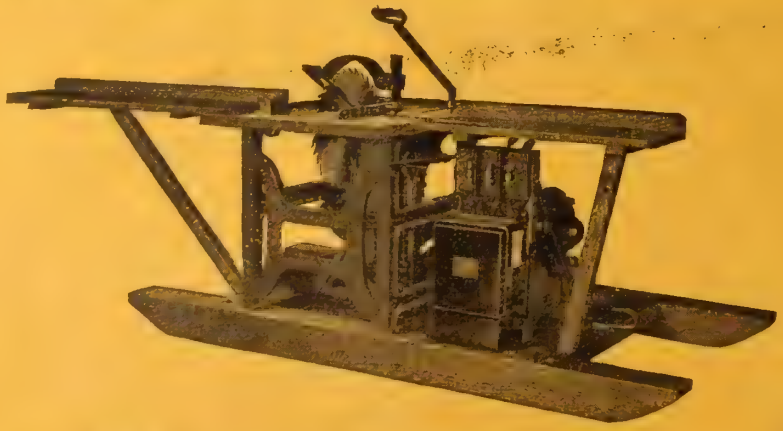

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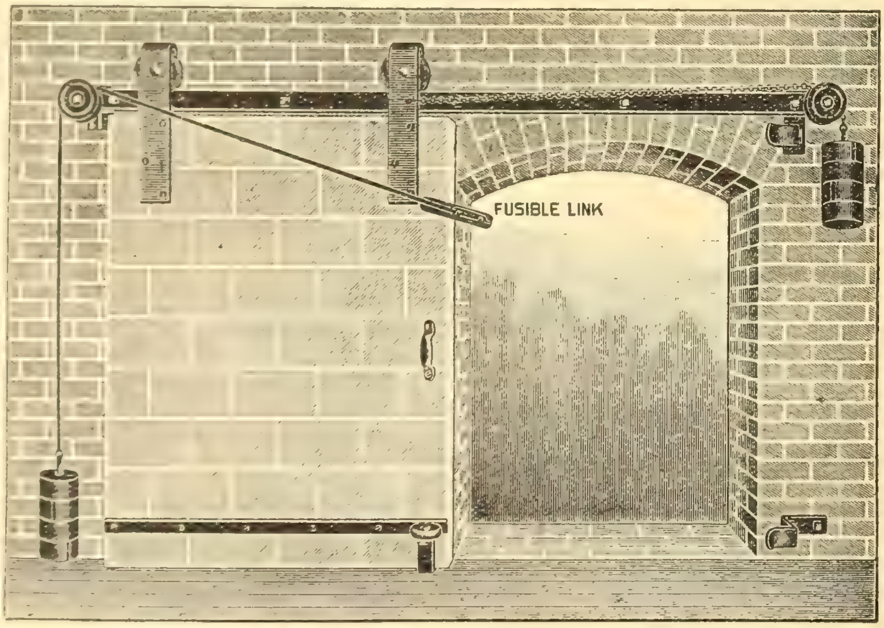

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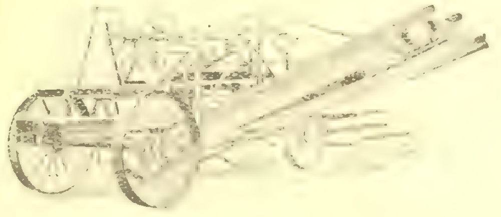

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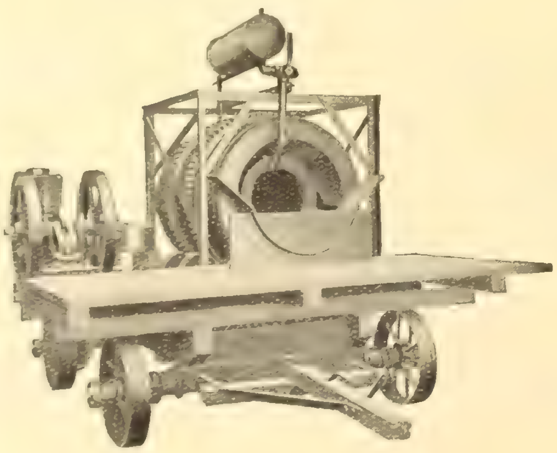

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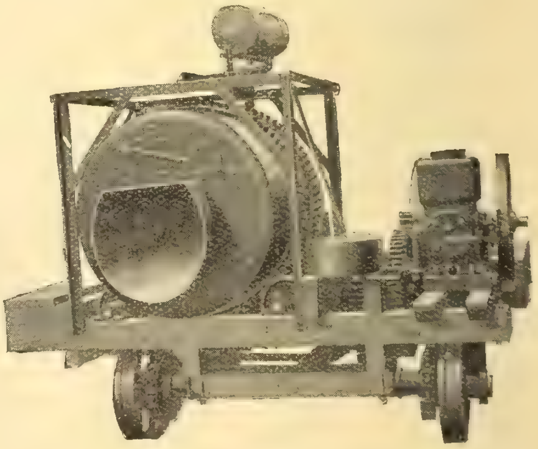

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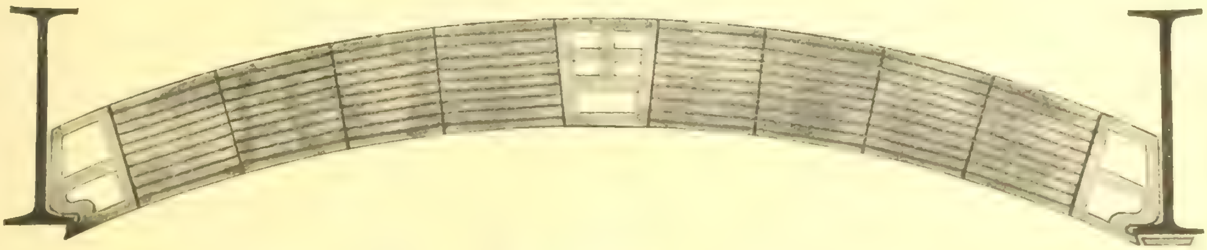

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"Champion" Rock Crushers

"Equal Work with Half the Speed"

Don't buy a Rock Crushing Plant until you see the **"Champion"** Crusher with its exclusive feature—the elliptical cam which gives the jaws two motions instead of one and makes it necessary to only run the crusher at half the speed others require.

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Wheel base 6 to 14 inches shorter than any other. You can get this waggon into and out of places without a hitch where other waggons will give all kinds of trouble.

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Packages	Every precaution is taken to provide the highest character packages.
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Adaptability	Our cement is adapted for all purposes where high grade cement is desired, such as in foundations for buildings and heavy machinery, tunnel work, cisterns, cellar floors, sidewalks, pavements, curbing, artificial stone, conduits, sewers, reservoirs, bridge piers and concrete work of all kinds.
Information	Architects and Engineers will be assisted with any information desired and we will co-operate in making any tests of our cement on request.

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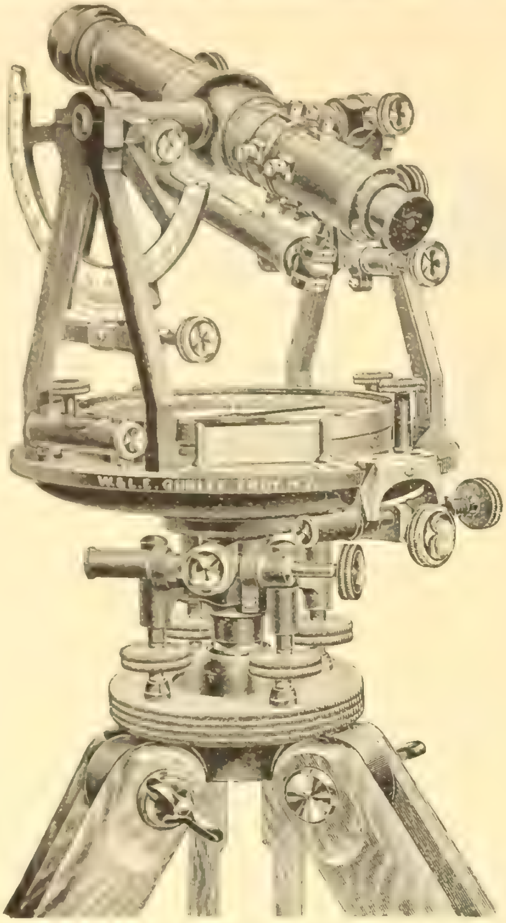

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a cheap article when low cost is its only recommendation, generally gets just what he pays for or less. Where **Public Health** and **Public Convenience** are at stake, good sewer pipe are **Cheap at any Cost.**

VITRIFIED Mimico Pipe SALT-GLAZED

are cheap as compared with others if you consider **Service**, but dear if the first cost is all that worries you.

We would rather have it said that our pipe are "Dear but Good" than that they "are cheap but only fair in quality."

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Sewer and Culvert **Pipes**

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Products include
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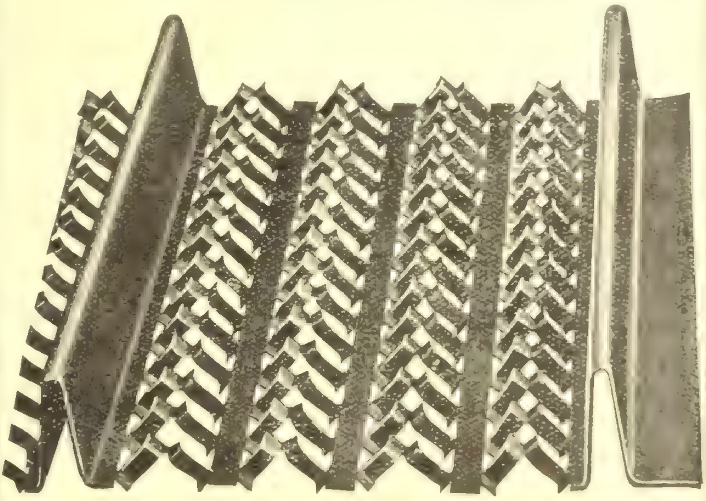
Combination of metal lath and channel in one sheet. Does away with expensive wiring and studding, also Form work when used as reinforcement for floor or roof slab.



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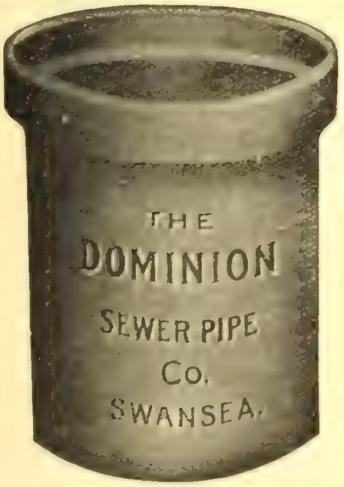
SEWER PIPES



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Impervious to Water.

Sizes manufactured and always in stock 4 in. to 24 in.

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We can serve you best. Our prices are right. The quality of our goods is of the highest excellence. We are the largest manufacturers of **Vitrified Salt Glazed Sanitary Sewer Pipe** in the world. Sizes, 3 in., 4 in., 5 in., 6 in., 8 in., 9 in., 10 in., 12 in., 15 in., 18 in., 20 in., 22 in., 24 in., 27 in., 30 in., 33 in., 36 in., 42 in. Lengths, 2 to 3 ft. Socket, Standard or Deep and Wide. Thickness in sizes 15 in., to 42 in., both Standard and Double Strength: We also manufacture Flue Lining, Wall Coping, Vitrified Conduit, Vitrified Curb, Paving Blocks, Drain Tile, etc.

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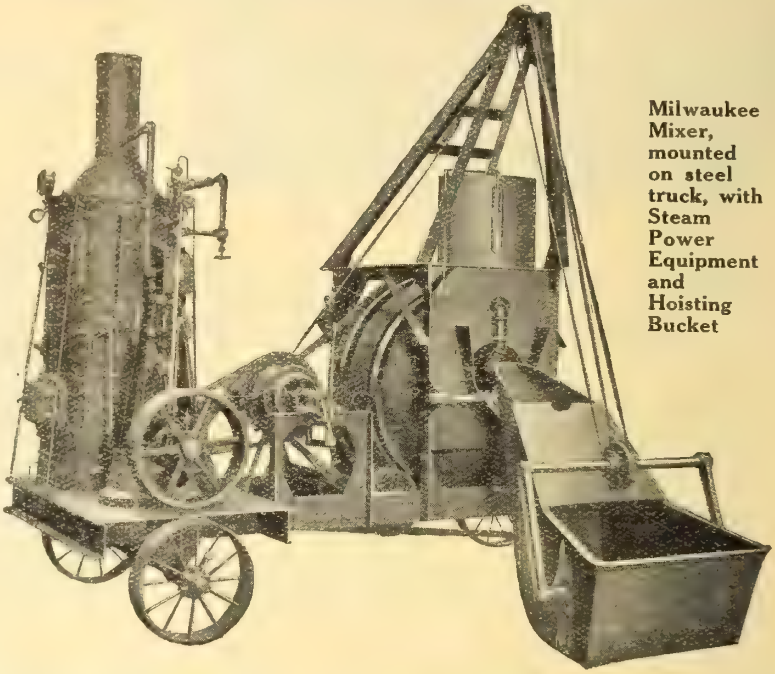
Milwaukee Concrete Mixer

Rosebery's Unequaled Proposition and one that is booking the orders. Write for 1911 Catalogue. Just out.



Milwaukee Mixer, mounted on steel truck, with Steam Power Equipment and Hoisting Bucket

OUR PROPOSITION

We will put a Milwaukee Mixer on your work for a period of five days. You are at liberty to test it thoroughly in every kind of work. If, at the expiration of this time, you are not fully convinced that it is all we claim and superior to any concrete mixer in the market, return it to us and we will pay the freight both ways.

No firm ever made, or can make, a more straightforward offer than this, as it will not cost you a cent if we fail to convince you of the superiority of the MILWAUKEE CONCRETE MIXER.

Milwaukee Concrete Mixer and Machinery Co. - Milwaukee, Wis., U. S. A.

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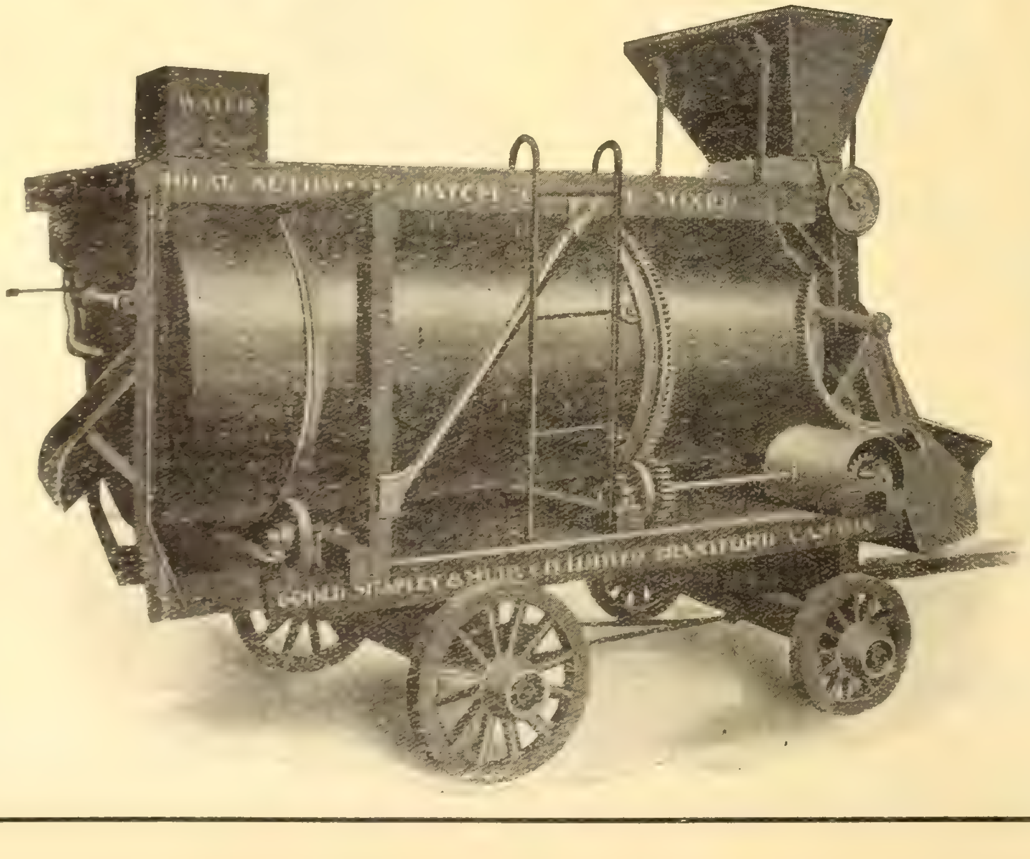
CONCRETE MIXERS



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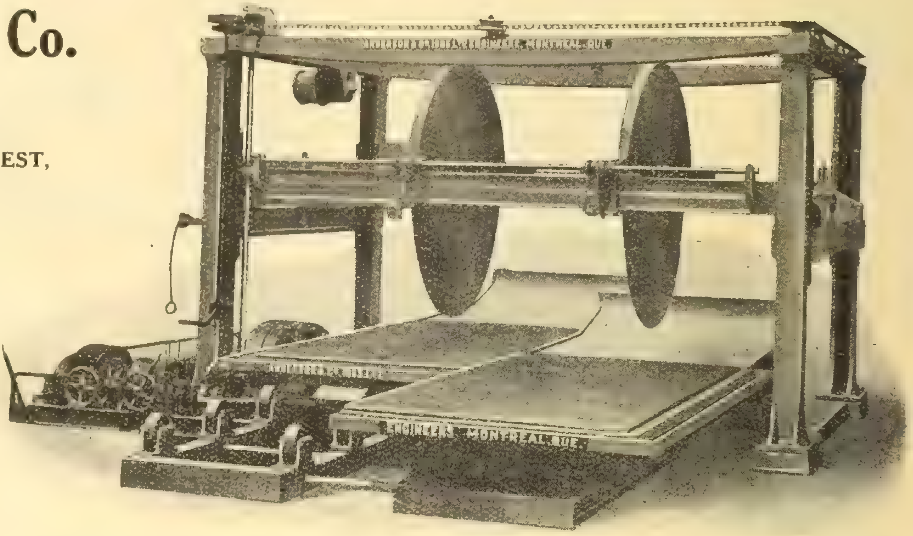

Anderson's Rising and Falling Diamond Saw, made under British and U.S.A. Patents 209179, 657262 SINGLE AND DOUBLE TABLES

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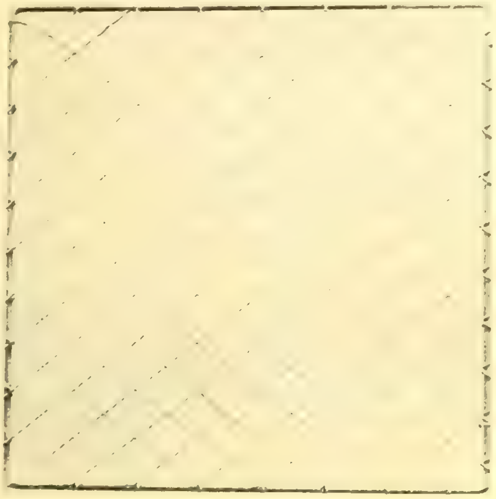

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BEST WORK QUICK DELIVERIES

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All Sizes

STONE

¶ For Roadways and Sidewalks also specially adapted for

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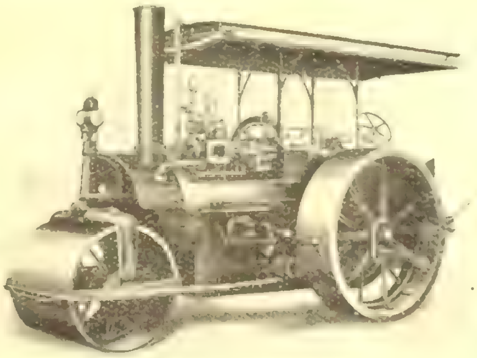

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Its special features [illegible]

Over 70 Waterous Rollers in use in Canada to-day

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"Galt" Art Metal Ceilings are sold strictly on their merits, their **mechanical superiority** and faithfulness to art in styles they typify.

Machine-cut beads (patented process) make them easy to apply. Plates snap into place and seams fit snugly together. Why waste your time puttying and peening the joints on old-fashioned stuff when the new is here and costs less?

Write us about your Metal Ceiling work

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Another reason for the remarkable Herringbone demand.

Herringbone Lath has the Best Key

THIS OR THIS

Something of a stunt for wet mortar.

The Herringbone Ribs, seen from the back of the lath are shelves. The clinch rests securely here. Instead of dropping, it tightly seals in the filaments.

Perfect Key means Never Cracking Plaster

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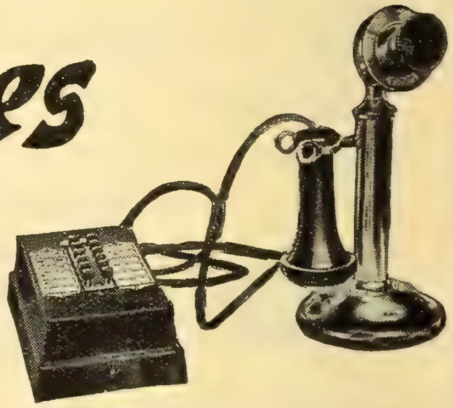

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Inter-phones will connect all your departments—bring all the strings of your business to your own office chair—and make it possible for you to get in touch with any of your employees—or for them to get in touch with each other—at a second's notice and without loss of time.

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Inter-phones cost little to install and operate at a low maintenance charge. The minutes they save will pay over and over again the cost of their installation and operation.

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These pumps have attained a world wide reputation for their excellence of design, high efficiency and ability to operate continuously for long periods, and under the severest conditions.

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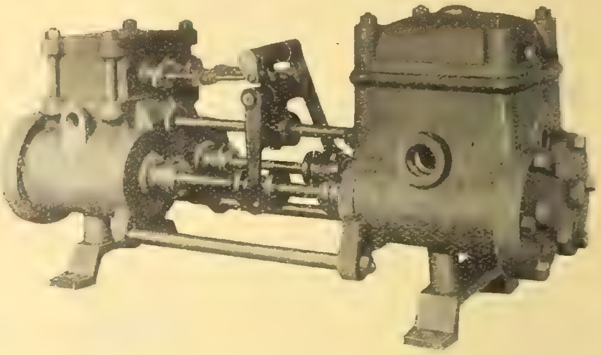

The above illustrates the Martin Standard Duplex Pump for boiler feeding and general service. They are specially designed for work where the requirements do not exceed a working pressure of 150 pounds per square inch.

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The kind that don't sag and warp

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Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

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Electric Traveling Cranes, Standard
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The latest method in this work for making concrete tougher, waterproof and a better color is to incorporate into your mixture

Guelph Hydrated Lime

This lime is very fine and fills all voids. It also prevents the concrete from drying too rapidly

Specify **Guelph Hydrated Lime** for your next job, it's the coming thing for use with cement.

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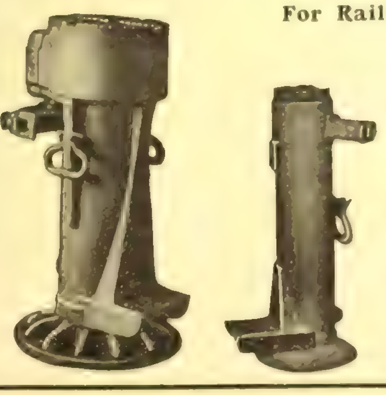
For Railway and Bridge Work, Contractors' and Builders' Use



Made by practical Jack Builders. Material: best grades of malleable iron and steel. Fully guaranteed as to durability and efficiency. The long even stroke of the lever together with the design and careful construction of the rack, makes it the quickest and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

To any responsible Firm or Railway in Canada any of these jacks will be sent on 30 days trial.

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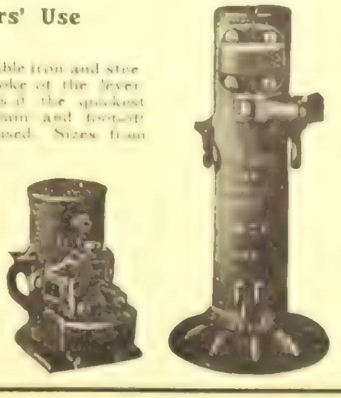
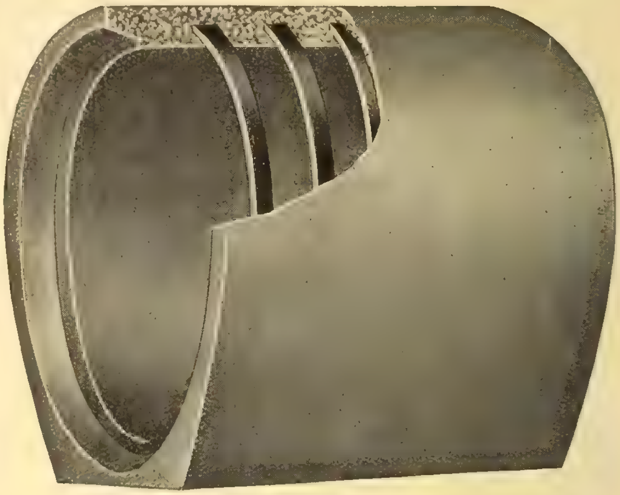
Stock carried by F. H. Hopkins & Company, Montrea



Railway Engineers and Contractors



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Timber culverts rot, clay pipe culverts break from frost or weight, metallic culverts rust and are woefully dear, CONCRETE CULVERTS LAST FOREVER and the price is relatively low.

The only absolutely **durable and frost-proof** culvert pipe is

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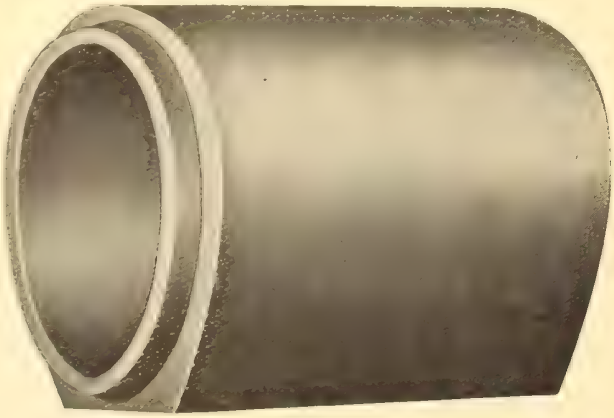
of **first quality.** The prime requisites of first quality concrete are **good raw material, proper proportions** and **scientifically correct methods.**

We possess all these in the highest degree. Our years of experience, our facilities and our raw material enable us to make **good concrete** and make it **always good.**

Nowadays the railway engineer must get results in **permanency** as well as in other matters. The contractor too must get results if he is to stay in the game. A very important result to him is the **economy** of buying material that **holds out,** that can be handled with **facility,** and that can be procured **promptly** and at a **reasonable price.**

Don't imperil your interests by using non-durable material, or by trusting to the random hits and misses of a novice when you can buy **durable, mature,** and **guaranteed concrete pipe,** from a long-established and reputable firm.



30" Section

Mature Stock

Prompt Shipment

Quality Guaranteed

No Loss from Breakage

Low Prices

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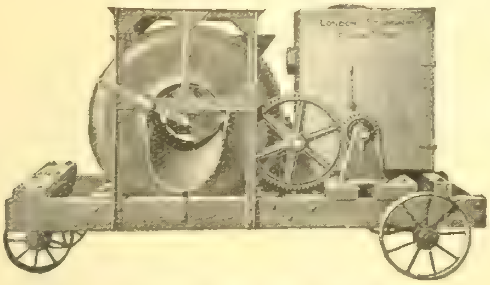
Dominion Concrete Co., Limited

KEMPTVILLE, ONTARIO

London Standard Batch Mixers

THE LONDON STANDARD DRUM BATCH MIXERS are made in four sizes, namely, one-third yard, one-half yard and one yard batches and are furnished with any equipment.

THE MANY NEW AND IMPROVED FEATURES of the London Standard Drum Batch Mixers appeal to everycontractor desiring a mixer of this type. WE CAN GIVE YOU THE BEST VALUE FOR YOUR MONEY of any Firm doing business, BECAUSE we manufacture only Concrete Machinery, and on this account we can sell you a machine at very much less cost than Firms who do not manufacture their own machines but handle a concrete mixer along with other lines of goods.



London Standard Drum Batch Mixer No. 1
Equipped with Gasoline Engine

We also Manufacture—
FACE-DOWN BLOCK MACHINES
CEMENT BRICK MACHINES
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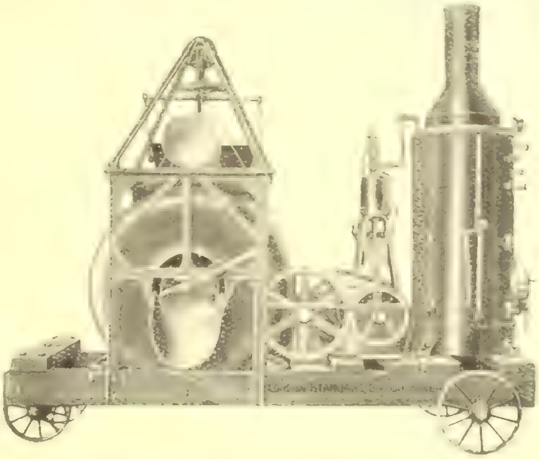
And a full line of CEMENT WORKING TOOLS

We are the largest manufacturers of Concrete Machinery in Canada, and can meet every requirement of the Contractor in the line of Concrete Machinery at the lowest possible cost. Tell us your requirements.



London Standard Drum Batch Mixer No. 2 equipped with Steam Engine and Loading Skip

London Concrete Machinery Co.
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19 Marmora St., LONDON, CANADA

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STEEL BARS
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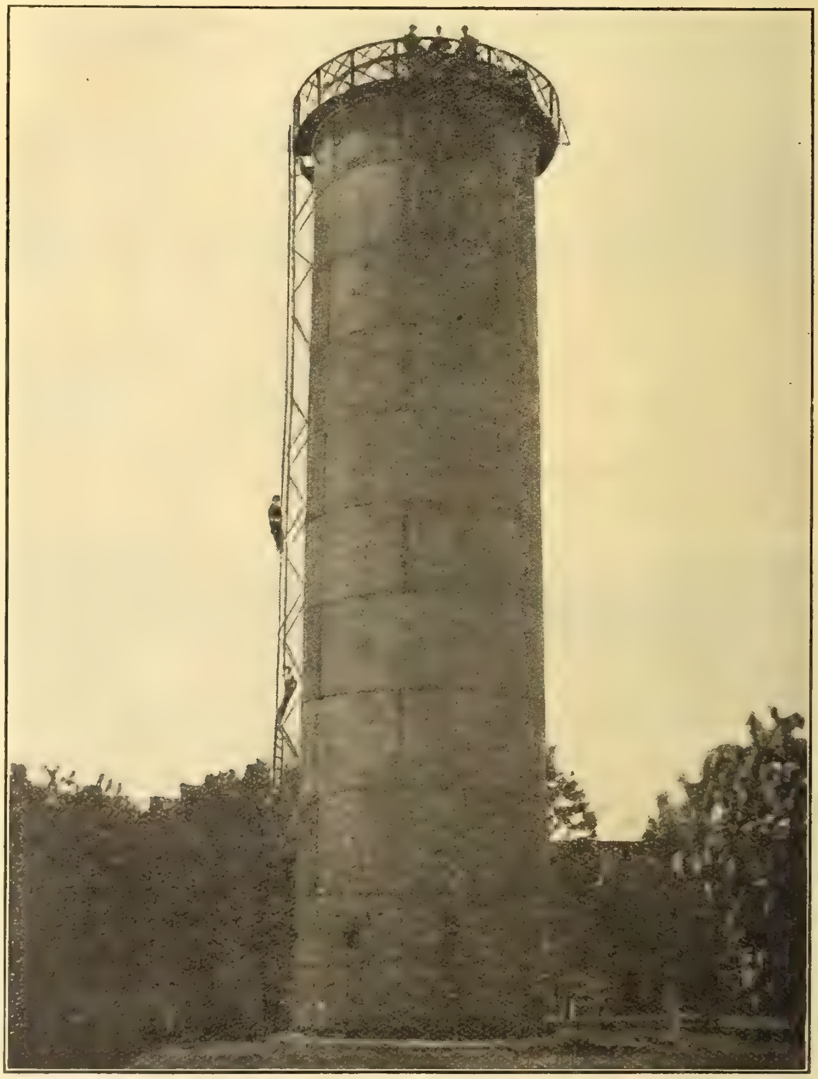

Water Tower at Whitby, Ont.

The John Inglis Company

ENGINEERS AND BOILERMAKERS Limited

14 Strachan Avenue - TORONTO, CANADA

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Berlin, Ont.

Tenders addressed to A. H. Millar, town clerk, will be received until March 7th for supply of the following for year 1911: sewer pipe, manhole castings, Portland cement, step irons. Specifications at office of town engineer. E. Bricker, chairman. Tenders were also called until March 2nd for the following in year 1911: laying cement walks, concrete tile, Portland cement, curb irons. Specifications at office of town engineer. H. A. Dietrich, chairman.

Edmonton, Alta.

Instructions have been issued to Supt. McLean of the water department to prepare specifications of the water pipe and valves which will be required to meet the season's departmental needs. Estimates of the season's requirements in sewer pipe will be prepared by Engineer Latornell.

Goderich, Ont.

We are informed that the $30,000 voted by by-law in January will be spent on the waterworks this year.

Harriston, Ont.

Tenders are called until March 15th for purchase of $35,000 waterworks debentures, etc. L. Brisbin, treasurer.

Lethbridge, Alta.

The construction of a gravity system of waterworks is being considered at an estimated cost of about $800,000. C. M. Arnold, city engineer.

Moose Jaw, Sask.

Tenders addressed to W. F. Heal, city clerk, will be received until April 10th for supplying material for and constructing a sewage disposal plant, etc.; also supplying two electrically driven centrifugal pump and auto starter complete with all piping connections. J. M. Wilson, city engineer. Advertisement in "Tender and For Sale Department" of this issue.

The Sewer and Water Committee recommended that city engineer Wilson prepare plans for storm sewers as proposed in his annual report. Also that plans be prepared for sewer and water extensions to South Hill as proposed by the engineer in his letter of February 17th. Further, that the engineer call for tenders as soon as possible for the construction of the sewerage disposal plant and sewer and water extensions planned in 1910. They further recommend that the city engineer be authorized to secure prices for the material to be supplied by the city for the work and submit same to this committee.

North Portal, Sask.

A waterworks system will be established here by the C. P. R. at an estimated cost of $50,000. F. E. Schwitzer, assistant chief engineer, Winnipeg, Man.

Petrolia, Ont.

This municipality is calling until March 20th for the construction of about 6,000 square yards of pavement and about 2,500 lin. ft. of concrete curb, etc. J. McHattie, town clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Point Grey, B.C.

Tenders addressed to H. Floyd, C. M. C. W., will be received until March 6th for delivery of steel pipes, valves, etc.; excavating, laying and jointing about 38 miles of pipes, etc. Specifications at office of the engineers, Messrs. Cleveland & Cameron, Vancouver.

Sherbrooke, Que.

Tenders are called until March 2nd for excavation of about 18,000 cubic yards of solid rock and 4,000 yards of earth for reservoir on Short property. Plans, etc., at office of the City Engineer.

St. Boniface, Man.

Plans are being prepared by City Engineer for construction of reservoir with 1,000,000 capacity.

St. Lambert, Que.

The ratepayers voted for the borrowing of $225,000 for permanent road improvements, among which are paved streets and concrete sidewalks.

Toronto, Ont.

York County Council agreed to the scheme of road improvement formulated by the City of Toronto and the Provincial Government.

Tenders addressed to G. R. Geary, Chairman of Board of Control, will be received until March 14th for supply of the following: 3,400 lin. ft. of 60-in. reinforced concrete pipe; 9,728 lin. ft. of 66-in. reinforced concrete pipe. Plans, etc., at Main Drainage Department or at office of city engineer.

The construction of the following asphalt pavements has been recommended by City Engineer Rust: Waverley Road, from Queen to south end, $11,366; Empire avenue, from Queen to Eastern avenue, $6,616; Barrett avenue, from 159 feet south of Chelsea to Edna avenue, $1,144; Maclennan avenue, from Edgar to Summerhill, $6,412; College street, from Manning avenue to Dovercourt road, $31,898.

Vancouver, B.C.

Among the local works to be considered is the paving of Broadway with granitoid blocks from Granville street to Ontario street, at a cost of $215,000. Another large work slated for consideration is the bitulithic paving of Twelfth avenue from Bridge street to Main street at a cost of $42,000

Victoria, B.C.

[illegible] road from Bridge street to Point Ellice bridge. This work which is part of the larger work of improving Esquimalt road right through to the city limits, is estimated to cost $18,346.

AWARDED

Belleville, Ont.

A contract was given to the Schuster Company for supply of 1,000 barrels, more or less, of cement at $1.57¼ per barrel, for the season of 1911.

Burnaby, B.C.

Walter Thomas, 731 Jervis street, Vancouver, has been awarded the contract for construction of waterworks system for D. L. 186, $24,088. Engineer in charge, Kilmer & Holland, Vancouver.

North Vancouver, B.C.

At a special meeting of the city council estimates for cast iron water mains were considered and that of Evans, Coleman & Evans for 1,100 tons of piping at $37,260 was accepted. Mayor McNeish.

Ottawa, Ont.

The council awarded the contract for supply of c.i. pipe to the Canadian Iron Corporation, Limited, Montreal, $11,579

Railroads, Bridges and Wharves

Brandon, Man.

The government and the G. T. P. will build their road to Brandon this year. Mayor Fleming.

Fredericton, N.B.

Hon. John Morrissy, Chief Commissioner, is calling for tenders until March 13th for lumber for the Fredericton highway bridge.

Tenders are called by the Department of Public Works until March 6th for re-building No. 18 Brook bridge, parish of Sheffield. Plans, etc., at above department and at residence of W. Hargrave, Lekeville Corner, Sheffield, Sunbury Co.

It is understood that the I. C. R. management plan a number of improvements on the Canada Eastern branch during the coming season. New steel bridges will, it is said, be placed this season across the Nashwaak river above Marysville, at Blackville, and also at Nelson Hall, between Caroll's Crossing and Doaktown.

Frankville, N.S.

The Department of Public Works, Ottawa, is calling for tenders until March 21st for construction of breakwater at Breen's Pond. Plans obtained at this department, at the offices of E. G. Millidge, Esq., district engineer, Antigonish, N.S., C. E. W. Dodwell, Esq., and on [illegible]

Halifax, N.S.

It is understood that the legislature will assist in the building of about 150 miles as a branch of the I. C. R. from [illegible]

Minnitonas, Man.

[illegible] for supply and [illegible]

steel Warren truss bridge and two concrete piers, etc. Plans, etc., on file at place of above and also at office of chief engineer, Department of Public Buildings, Winnipeg.

Ottawa, Ont.
Tenders addressed to Charles Macnab, county clerk, will be received until March 13th for construction of one reinforced concrete bridge, Tp. of Osgoode, and two reinforced concrete bridges, Tp. of Huntley. Plans, etc., at office of R. W. Farley, county engineer.

Vancouver, B.C.
The C. P. R. has called for tenders for the construction of thirty miles of the Kootenay Central south from Golden, B.C. The southern terminus will be Galloway station, on the main line of the Crow's Nest Pass Railway, near Cranbrook.

Public Buildings, Churches Schools, etc.

Abbotsford, B.C.
Tenders for erection of 2-room building as annex to school here. F. C. Gamble, public works engineer.

Berlin, Ont.
It has been decided to launch a campaign to raise $30,000 for the purpose of erecting a permanent home for the Y. W. C. A.

Brandon, Man.
The plans of Messrs. Shillinglaw & Marshall for erection of new curling rink were considered by the club. No decision was made.

Brantford, Ont.
The St. George Baptist Church recently destroyed by fire will be rebuilt at an estimated cost of $20,000. Rev. Mr. Newcombe, pastor.

Calgary, Alta.
The plans of Davis & Brooks of this city have been accepted for the new city hall building. Ten sets of plans were submitted.

Collingwood, Ont.
Tenders are asked by the trustees of Loree S. S. No. 7, Collingwood Tp., for the building of a new school, material on the ground. Plans, etc., on application to secretary, D. Sheridan, Loree, Ont.

Dartmouth, N.S.
The school board and Board of Trade have under discussion the erection of a modern school here. J. L. Wilson, chairman Public School Board.

Edmonds, B.C.
The municipality of Burnaby will submit a by-law to the ratepayers calling for over $80,000 to be expended in the purchase of several school sites.

Edmonton, Alta.
Plans for the erection of new church on Twenty-first street for West End Methodist Church will be called shortly. Rev. J. E. Coulter, pastor.

The Masonic Temple Company have under serious consideration the commencement of their new Temple shortly at an estimated cost of about $125,000. Directors, T. M. Grindley, F. M. Morgan, H. Darling and others. Noted previous .

[illegible] W. Lines, architect, was awarded the first prize in the plan competition for the new $100,000 stock pavilion to be erected by the Exhibition Association this year. Instructions will be issued to prepare specifications, after which tenders will be called. Plans call for a brick and stone building, 2-storeys, 340 x 190 feet, etc.

Fort William, Ont.
Tenders addressed to Hood & Scott, architects, Murray Building, will be received until March 6th for erection of Free Library.

Tenders addressed to R. E. Mason, architect, will be received until March 11th for new Nurses' Home for the McKellar General Hospital; also for erection of additions, etc., to Central school, until March 10th.

Gad's Hill, Ont.
The following tendered for erection of school here: Geo. Fink, Stratford, $2,327; C. Daburne, Amuhee, $2,232; Henry Reis, Milverton, $2,325; William Elligsar, Stratford, $2,346. Under date of last information contract had not been let.

Galt, Ont.
A by-law will shortly be introduced to raise $25,000 for addition to hospital.

Tenders addressed to Rural Dean Ridley, chairman building committee, will be received until March 7th for erection of school house for Trinity Church congregation. Plans, etc., at residence of architect, Wm. Scott, Galt.

Goderich, Ont.
We are informed that the tenders for new town hall here opened about March 1st. Estimated cost, about $35,000.

Guelph, Ont.
Tenders addressed to the Guelph Humane & Children's Aid Society, care of Mr. Tovell, 23 Douglas street, will be received until March 7th for construction of "The Shelter." W. A. Cowan, architect.

Kingston, Ont.
Plans for the new wing for the post office here have been passed at Ottawa and William Newlands, architect, is authorized to call for tenders.

Tenders are called until March 10th for the several trades required in erection of Nicol Building for School of Mining, Queen's University. Estimated cost, without heating, etc., $45,000. Messrs. Power & Son, architects. Advertisement in "Tenders and For Sale Department" of this issue.

London, Ont.
The separate school board have under consideration the erection of a new school in the north end this summer.

Montreal, Que.
The proposal to build a new club house for the Shamrock A. A. A. has been abandoned and it has been decided to make considerable extensions to the old building in Mile End. This will include a modern gymnasium, swimming bath, bowling alleys and hand ball court. The plans are now being prepared by the executive committee and work will be started early in the spring.

Nelson, B.C.
Tenders for the erection of isolation hospital are called. G. C. Mackay, city engineer; Dr. Hartin, M.H.O.

Orillia, Ont.
An addition to the Y. M. C. A. Building will be built. A campaign to raise $10,000 has been commenced.

Otter Point, B.C.
Tenders were called by Public Works Department, Victoria, until March 1st for erection of 1-room school here. M. Emerson, secretary of school board.

Ottawa, Ont.
The Dominion government will have to consider the erection of a separate building in Ottawa as a national art gallery.

Building Superintendent Garvock will prepare plans for annex to Mulchton school. Noted in last issue.

A committee appointed by both sides of the House recommend the construction of a new wing on the Senate side of the Parliament Building. This addition, it is calculated, will provide a stack room for about 250,000 books and will also give a couple of additional rooms for Senate Committee purposes. The cost of this proposed structure would be about $300,000.

Regina, Sask.
Mr. M. W. Sharon is the architect in charge of the erection of the two new buildings for the Dominion Fair. Work, it is stated, will begin at once.

In order to concentrate the diocesan buildings, a deputation of clergymen from the diocese will wait upon Premier Scott to ask for a site for diocesan buildings on the old gaol grounds at a reasonable price. They will include a cathedral, St. Chad's College, a bishop's court and residence, and a hostel. The cathedral alone will probably cost more than $250,000.

Renfrew, Ont.
Architect Meredith, of Ottawa, is being consulted by the separate school board with reference to building, the board having decided to erect a new school this year.

Simcoe, Ont.
Tenders are called until March 20th for erection of brick veneered 1-storey school house with basement, S. S. No. 14, Charlotteville. Plans, etc., at residence of Abram Neilson, Walsh, Ont.

South Vancouver, B.C.
A by-law to authorize the expenditure of $60,000 on schools will be submitted to the people.

St. Catharines, Ont.
The Public School Board decided to call for tenders as soon as plans for Alexandra school can be perfected.

Toronto, Ont.
The congregation of the Grosvenor Street Presbyterian Church have decided to move to a new site as soon as possible.

An addition to Sherbourne Street Methodist Church has been authorized by the congregation, and work will be started about April 1. Cost, about $50,000. Rev. Dr. S. P. Rose, pastor; members of the building committee are: Messrs. F. H. Clark, J. W. Flavelle, H. H. Fudger and John N. Lake.

Vancouver, B.C.
St. Mark's congregation, Kitsilano, have decided to erect a new church to cost about $125,000. Building committee, Messrs. J. Z. Hall, F. Bayliss, G. Brown, W. J. Gilbert, S. Wye, C. Buscombe, P. Gomery, Captain Fleming and Maillewe was appointed. Architect R. S. Twizell submitted plans.

Under date of last information tenders for erection of Chalmers Presbyterian

Church were being called for. Plans call for concrete, brick and stone, size (ground floor), 9,000 ft.; number of floors, two; estimated cost of building and equipment, $80,000. Architect, S. B. Birds, A.R.I.B.A., Loo Block.

Plans were presented for the erection of Labor Temple, to be erected by the Trades and Labor Council at the corner of Dunsmuir and Homer streets. It will be four stories in height and will cost $143,000. The contract has been awarded and the permit for the work will be issued in a few days.

Victoria, B.C.

Sheps will shortly be taken for the purpose of erecting a new Christ Church cathedral, to cost probably $250,000.

Warren, Man.

Tenders addressed to M. Oughton, Hanlan, Man., will be received until March 4th for the erection of 4-roomed school for the S. D. of Warren. Plans, etc., with the architect, R. L. Smith, 509 Builders' Exchange, or with M. S. Peacock, secretary - treasurer school board.

Winnipeg, Man.

An extension to Holy Trinity Church will be built at once at a cost of $70,000. Address Rev. Archdeacon Fortin.

AWARDED

Mount Forest, Ont.

The tender of Contractor Proctor, of Sarnia, for the new post office, has been accepted by the government.

New Westminster, B.C.

The contract for the new Y. M. C. A. building has been let to Messrs. Sloan & Harrison, building contractors, of this city, $37,000. This does not include the heating and plumbing. For the heating $5,000 will be required. The building will be of stone and brick and it is expected that it will be completed in August.

Orillia, Ont.

The plans of H. W. Angus, North Bay, were chosen from among eight others submitted for the erection of new Sunday school building for Presbyterian Church here. T. G. King, secretary.

Winnipeg, Man.

The contract for erection of Selkirk avenue branch, Y. M. C. A. building has been awarded to S. Brynjolfsson & Co., Builders' Exchange, Winnipeg. The contract includes all trades, except tile, marble, heating and plumbing. Architect, Jackson & Rosencranz, New York. J. H. G. Russell, Winnipeg. Tenders for erection of central building will be called shortly. Estimated cost of latter, about $275,000.

Residences

Brantford, Ont.

Mr. J. M. Shuttleworth will erect a fine new residence on the Hamilton road this year.

Brockville, Ont.

Tenders addressed to B. Dillon, architect, will be received until March 4th for cement and brick work, etc., required in the erection of garage, carriage house, etc., for Mrs. C. E. Fulford.

Ottawa, Ont.

Recent building permits include: W. J Fitzpatrick, dwelling, Sunnyside avenue, $2,500; W. O'Byrne, dwelling, Archibald street, $2,800; W. H. Hooper, dwelling, Carling avenue, $6,000; Mesdames M. E. Elliott and J. E. Lowe, dwelling, Percy street, R. A. Kemp, builder, $6,500; W. J. Best, dwelling 2nd avenue, $3,800.

Tamworth, Ont.

Samuel Shannon's residence was burned on the 22nd ulto. Loss, $12,000.

Victoria, B.C.

Building permits were issued to Mrs. McCarter, dwelling on David street, to cost $2,500; to Mr. Reginald Genn, dwelling on Prior street to cost $2,000; W. Dunford & Son, dwelling on Princess avenue, $2,800; J. Townley, dwelling on Simcoe street, $2,800; E. Tuck, dwelling on Grant street, $2,800; W. N. Hall, dwelling on Robertson street, $2,000.

Walkerville, Ont.

The summer residence of Tracy McGregor was destroyed by fire on the 22nd ulto. Loss, about $30,000.

Winnipeg, Man.

Building opeartions will commence on the erection of a residence for the Norwood Presbyterian Church. Rev. R. J. Hay, pastor.

Tenders addressed to E. D. Tuttle, architect, 701 McArthur Building, will be received until March 13th for erection of residence for Mr. A. A. Miller, on Huron street.

Tenders addressed to Hugh G. Holman, architect, Suite 4, Monadnock Bdg., 313 Fort street, will be received until March 4th for erection of residence for Mr. T. G. Thompson. Plans, etc., at office of the above, or at Builders' Exchange.

AWARDED

Victoria, B.C.

Permit was granted to Mr. Simon Leiser for dwelling to cost $18,000. Contractors, Murray & Mckinney; architect, S. McLure, 606 Front street.

Business Buildings and Industrial Plants

Blairmore, Alta.

The grinding room of the Rock Mountain Cement Company's plant was destroyed by fire on the 20th ulto. Estimated damage, about $5,000.

Brantford. Ont.

Tenders were called until February 28th for excavation of site for proposed new Royal Loan Building. Specifications at office of L. D. Barber, architect, Temple Building.

Calgary, Alta.

Tenders addressed to Lang & Major architects, Board of Trade Building, will be received until March 6th for excavation and concrete work required in the founadtion of a business block for Lieut.-Col. James Walker on [illegible].

Tenders for one or more of the following buildings will be received at the office of the C. P. R. Division Engineer, Calgary. C. P. R. Standard No. [illegible] Section House -- Bowell, Langdon, Maharg, Cheneka, Anthracite, Sawback, Stephen, Cathedral, Airdie, Wessex, Innisfail, Penwin, Labuma, Menaik, Mile 6, 7, Wetaskiwin Subdiv., Stowe, Lundbreck, Sandstone, Azure. C. P. R. Standard No. 5 Station (with 12-foot freight shed) western lines, at—Tompkins, Redcliff, Suffield, Bow Island, Burdett. C. P. R. Standard No. 10 Station, at—Gleichen, Bassano, Hosmer. C. P. R. Standard No. 1 Bunkhouse, at—Calgary and Red Deer. C. P. R. Standard Plan "A" Station (with 50-foot freight shed), at Canmore and Bittern Laks.

Locomotive Foreman's Cottage, Red Deer.

Six-stall addition to Standard No. 2 Engine House, Red Deer. Plans, etc., at the office of the assistant chief engineer, Winnipeg; division engineer, Moose Jaw, Calgary and Vancouver; resident engineer's office, Medicine Hat and Cranbrook.

Chatham, Ont.

The council are negotiating with an iron and steel industry which is seeking the location of a Canadian branch. Ald. Dunn and S. B. Arnold are interested.

Dalhousie, N.B.

A plebiscite will be taken as to the offer of civic privileges to Chappell Bros., Sydney, N.S., in return for which large saw and planing mills will be erected to take care of the lumber cut on their newly acquired limits across the river in Bonaventure county.

Edmonton, Alta.

The C. N. R. are to prepare plans early this spring for additions and extensions to their Edmonton terminals, to cost $30,000.

We are informed that the building of the business block by representatives of the Houston Estate, has been postponed. Noted in issue of February 1.

Espanola, Ont.

Tenders for the building for the Spanish River Pulp & Paper Co., are being called for, and the machinery has been ordered. It is the company's intention to have the mill in operation by October next. Noted previously.

Fort Frances, Ont.

The C. N. R. plan to build a $200,000 tourist hotel at Pither's Point park, provided the site is given to them.

Tenders are called for erection of school for S. S. No. 3, Devlin. Plans, etc., at residence of G. C. Watson, secretary, LaVallee.

Fort William, Ont.

Plans for the erection of plant for the Swift Canadian Company have been approved and excavation will commence as soon as possible. Estimated initial cost, $75,000. E. M. Bell, local manager.

It is announced that Chas. Greer, manager of the Alexander Hotel, will erect a large hotel at Graham, the G.T.P divisional point near the junction of the transcontinental line of the G. T. P and the Lake Superior branch.

Guelph, Ont.

The property owned by Mr. J. J. Mahoney, has been purchased with a view to the erection of a factory, it is stated

The C. P. R. management have called for tenders until March 6th for purchase of the buildings standing on the C. P. R.'s premises on Cardigan street. A. L. Hertzberg, division engineer, Toronto.

The plans for the erection of the arcade are almost completed and show that on the ground floor will be built a number of stores, some on each side, with numerous offices above, the whole thing to be topped by a tower.

Hamilton, Ont.

The Oliver Chilled Plow Works Company of Canada, secured a permit to erect a $200,000 building, and will, it is announced, spend $600,000 on its local plant. Tenders for a 1-storey 135 x 576 ft. foundry building are called for.

Moose Jaw, Sask.

The Saskatchewan Flour Mills will increase the mill capacity from 1,600 to 2,000 barrels per day, and construct an oatmeal mill with a daily capacity of 600 barrels. F. A. Bean, managing director.

Messrs. Willoughby, Pickett & Craig have made application on behalf of clients for the purchase of building lots here. The purchasers desire to erect a building of from $35,000 to $40,000 value, about 100 to 115 feet, built of brick or cement on the outside and finished by the slow burning process. Action delayed.

Montreal, Que.

On the 27th ulto. damage to the extent of about $150,000 was done to the Ives Modern Bedstead Company's plant.

Damage to the extent of about $20,000 was done to the Brault Carriage Works, St. Antoine street, on the 24th ulto.

The damage by fire on building and stock of D. C. Brosseau & Co., wholesale grocers on the 20th, amounts to about $75,000.

The C. P. R. has a permit for the erection of new freight sheds, to extend from Lacroix street, near the Place Viger station, to Montcalm street, $66,000. J. G. Sullivan, assistant chief engineer, Montreal.

Ottawa, Ont.

Plans are being drawn for the structural steel works. H. W. Baker, publicity commissioner.

Nimmo and Soper have formed a syndicate which has purchased a lot on Albert street near Bank where a large office building will be built.

F. X. Tradburks is preparing to build a large commercial building at the corner of Somerset and Lebreton street. It will contain nine stores.

The Bank of Ottawa has purchased a large block on Sparks street and will, it is understood, continue its large bank building on Wellington street through to Sparks street.

Port Hope, Ont.

Mr. Thomas Garnett has the contract to build the substation for the Seymour Electric Light and Power Company. The building will be 41 x 33, constructed of concrete, brick and steel. It is to be completed by May 15th.

Portage la Prairie, Man.

The Bank of Ottawa will erect a branch office here this spring. Plans have been prepared. Contract not let yet. T. B. Sharpe, local manager.

Quebec, Que.

The Canadian Bank of Commerce has purchased the Victoria Chambers property, St. Peter and St. Paul streets, Quebec. The intention is to remove the present building and erect a new branch.

Regina, Sask.

The Aultman-Taylor Co., Marion, Ohio, is having plans prepared for a large warehouse to be erected here this spring.

Tenders are requested until March 4th for erection of warehouse for the Great West Saddlery Co., Ltd. Messrs Storey & Van Egmond, architects.

Tenders addressed to Storey & Van Egmond, architects, Regina and Saskatoon, will be received until March 6th for erection of bank building for the Bank of Ottawa.

Red Deer, Alta.

The Alberta Hotel Company, Calgary, will build here this spring a new hotel. Estimated cost, about $60,000. W. J. Stock, Empire Hotel, Calgary, is interested.

Saskatoon, Sask.

A. Bowerman is having plans prepared for a business block to be constructed here at a cost of $140,000.

The J. L. Case Co., of Racine, Wis., are negotiating towards location of a warehouse here, plans for which call for a building about 400 feet x 250 feet.

St. Catharines, Ont.

Under date of last information the contracts for erection of gymnasium and assembly hall rear of Collegiate Institute had not been awarded. Estimated cost of building, $10,000; of equipment, $500. The architect has not been chosen yet.

A. E. Coombs is interested.

Negotiations were concluded for the purchase of 40 lots here, which, it is understood, will be used as an industrial site by Cushing Bros., Limited, Calgary, for a large woodworking establishment.

St. John, N.B.

The Bank of New Brunswick has purchased from the St. John Real Estate Company a lot in Haymarket square, and it is understood that they will erect a new bank building there in the near future.

Toronto, Ont.

A transept and nave will be added to St. Alban's Cathedral at an expenditure of about $300,000. It will be commenced, if possible, in October next.

Plans prepared by Dr. R. A. Cram, Boston, a noted church architect, were finally accepted. Bishop Sweeney is in charge.

A. R. Denison & Stephenson, architects, 20 King street west, are calling for tenders for removal of houses upon property corner of Broadview and Elliot street, the proposed site of branch for Home Bank of Canada.

Vancouver, B.C.

Mr. George Dawson is having plans prepared for the proposed business block to be erected at the corner of Hastings and Main streets at an estimated cost of $125,000.

Mr. Gordon E. Brady, Montreal, is here, with the intention, it is reported, of looking for a site for the location of a steel plant to handle the western business. Tract of land opposite Port Mann is favored.

F. L. Buckley, managing director of the British Canadian Lumber Company, has been given authority to carry out large extensions for the company, which include the erection of a saw and pulp mill on Massett Island where lumber has been purchased.

Among the building permits were the following: Atkins & Watson, 4-storey building on Hornby street; E. A. Marshall, 3-storey apartment house at 2515 Yukon street, $50,000; Hotel Vancouver annex, covering an expenditure of $190,000; Skene & Christie have the contract; Honeyman & Curtis are the architects. Plans for this building were filed last December.

Victoria, B.C.

Building permit was issued to Messrs. Brown & Simmons for a livery stable to be erected on Fisguard street to cost $8,400.

Tenders are called by Thos. Hooper, architect, Royal Bank Chambers, until March 2nd for erection of 3-storey, etc., brick building on Fort street.

Winnipeg, Man.

Plans have been prepared for the remodelling of the C. N. R. ticket offices here.

Tenders are called until March 1st for the St. Charles Country Club Building per plans and specifications on view at the Standard Trust Company's offices, Keewayden Block, Portage avenue east.

The Rat Portage Lumber Company is preparing plans for its new sawmill which will be built on the site of the old one in Norwood destroyed by fire last fall. The mill will be modern in every respect and will have a capacity of 40,000 feet daily.

E. F. Hutchings, President Great West Saddlery Co., announces the company will erect the following branch warehouses this summer: Regina, Sask., 3-storey, 50 x 90 feet, of solid brick, costing $25,000; Edmonton, Alta., 6-storey, 53 x 150 feet, costing $102,000; Saskatoon, Sask., 6-storey, 120 x 50 feet, costing $90,000.

AWARDED

Ottawa, Ont.

Esdale and Douglas have been awarded the contract for building an annex to stores belonging to S. McClenaghan, corner of Division and Somerset street. J. P. MacLaren, architect.

Rosthern, Sask.

The contralt for Mr. H. A. McEwen's new building on Ens street has been let to Wilker & Son.

Vancouver, B.C.

M. R. P. Foreshaw is the contractor in charge of the erection of hotel for Sam Kee. Patrick Donhoe, architect. Estimated cost, $95,000.

Power Plants, Electricity and Telephones

Alberni, B.C.

The Alberni Electric Light and Power Company, Limited, with head offices in Alberni, has been incorporated, and it is announced by the president, Dr. A. D. Morgan, that it will be in a position within two months from date, to install fixtures and supply electric light in every house in Alberni. Arrangements have been made for the purchase of a steam engine and boiler, and the electricity will thus be generated until such time as the demand for light and power becomes large enough to justify a much larger expenditure on the harnessing of water power somewhere in the district. W. W. G. Allister, secretary-treasurer; H. B. Mitchell, mechanical engineer.

Brandon, Man.

As a result of the report on the defective wiring in the hospital here, new wiring will be installed at a cost of about $700.

Calgary, Alta.

The Natural Gas Company, Calgary, will lay piping from Gleichen, 55 miles distant, at an approximate cost of $3,500,000. Work will be started this spring.

Fort William, Ont.

The directors of the Kaministiquia Power Company have voted to spend $250,000 this summer for enlarging the power plant. R. S. Kelsch, construction engineer.

Ottawa, Ont.

A company is being organized to develop power at Carillon and Point Fortune on the Ottawa river under a lease granted to C. Ross, of Ottawa, about three years ago.

The Department of Public Works will issue a call for tenders for the construction of the dam at the foot of Quinze Lake, about 18 miles from head of Lake Temiskaming, the estimated cost of which is $59,000. Tenders will also be called this spring for the new dam at the head of Gordon Creek, which it is expected can be rebuilt from the present Lumsden estate dam, for a cost of about $5,000.

Prince Albert, Sask.

Mayor Holmes and Ald. S. McLeod and James McKay, K.C., who comprised the deputation to Ottawa report that Prince Albert will be given the La Colle Falls power site on much the same terms as Winnipeg secured the Point Bu Bois site, a certain amount of development of power being required. In regard to the proposal that the government in making out its scheme to make the Saskatchewan river navigable should cooperate with the city in its power scheme work at La Colle Falls, the deputation said that the suggestion had been favorably received at Ottawa.

Regina, Sask.

A bill is now before the legislature which provides for a tax of 2 cents per acre on all land in the province for telephone purposes.

Renfrew, Ont.

The indications now are that Renfrew municipality and the Renfrew Power Company will jointly build a reservation dam at the outlet of Round Lake, one of the upper lakes of the Bonnechere. A considerable sum of money will probably be required for the work and permission to levy toll on all power users along the river benefited through the storage of water.

Toronto, Ont.

Tenders are called until April 4th for delivery of 1,340 tons or open hearth steel rail, etc.; also 30,000 untreated wood ties, etc. Advertisement in "Tenders and For Sale Department," of this issue.

Victoria, B.C.

It is the intention of the city to install about 150 lamps at various points. The order will be further extended on the ratepayers apprising the electric light committee. Chairman, Ald. H. M. Fullerton.

Yorkton, Sask.

Arrangements for the instalment of an electric lighting plant to supercede the present acetylene system are almost completed. It was expected that the new plant would be ready for use in May, but it is probable that all the work will not be done until June. W. E. Skinner, Limited, Winnipeg, are the consulting engineers. Cost, about $40,000.

Wolseley, Sask.

Announcement has been made by the provincial government of the erection of a long-distance telephone line from Wolseley to the Manitoba boundary.

AWARDED

Fort Frances, Ont.

Nelson & Cassaday were awarded the contract to supply electric light poles for the town lighting system. The price to be paid is $1.75 per pole for 30 ft. 6 in. top and $3.25 per pole for 35 ft. 7 in. top.

Winnipeg, Man.

The following contracts for the ensuing year have been awarded by the Manitoba government telephone commission: Poles, J. L. Hyland Company; hardware, Miller, Morse and Company, J. H. Ashworth Company, and Northern Electric Company; insulators, Pittsburg High Voltage and Insulator Company, and August Fibiger; copper wire, Wire & Cable Company, and Eugene F. Phillips Electric Works; iron wire, Steel Company of Canada and Northern Electric Company; cable, Wire & Cable Company; cross arms, side block and top pins, etc., Northern Electric Company; Tri-Provincial Electric Supply Company, West Canadian Lumber Company, and Brown and Rutherford; underground conduits, Tri-Provincial Electric Supply Company.

Miscellaneous

Fort William, Ont.

The Canadian Fire Underwriters' inspector in his report asks for two additional fire engines, also a chemical engine to be placed in No. 8 station.

Ottawa, Ont.

Tenders addressed to the Chairman of Board of Control will be received until March 14th for delivery of combination automobile fire engine, pumping capacity from 700 to 800 gallons a minute. John Henderson, city clerk.

Tenders addressed to A. Johnston, deputy minister of marine and fisheries, will be received uptil March 20th for supply and delivery of 190,000 gals., etc., of illuminating oil and 55,000 imp. gals. of oil fuel, according to specifications, etc., which can be obtained from the Collector of Customs at Toronto, Petrolia, Sarnia, and from the agents of this Department at Montreal, Quebec, St. John, Halifax, Pictou, Charlottetown, and from the purchasing and contract agent, Marine Department, Ottawa.

Vancouver, B.C.

The following building permits have been issued: A. A. Burpee, frame stable, 25 Twelfth avenue west, $2,500; Robertson & Cowperthwaite four frame dwellings, 2327 Trafalgar, $6,000; D. Alecorn, dwelling, 2721 Third avenue west, $2,000; Atkins & Watson, brick garage and rooms, Hornby street, $10,000 (four stories); E. A. Marshall, three storey brick stores, etc., 2515 Yukon street, $50,000; Mrs. A. Hamilton, frame dwelling, 1656 Seventh west, $2,200; Grace Church (Methodist), 737 Fourteenth east, $2,595; Mr. T. Medforth, frame dwelling, 1035 Twelfth west, $3,500; Geo. Pound, frame dwelling, 1038 Eleventh east, $2,000; T. Sedgwick and J. Mackenzie, St. George street, $8,000; A. Shaw, frame dwelling, 2841 Scott street, $3,000; A. Steoff, frame store, Park drive, $5,000; E. Hammond & Son, 1258 Barnard street, $4,000; Beard Home Building Company, 1916 and 1735 Eleventh avenue west, $4,000 each; F. O. Dixon, 1624 Graveley street, two houses, $3,500; Shaw Bros., 1126 Eleventh avenue west, $4,200; W. J. Harrington, dwelling, 1076 Seventh avenue west, $2,500; M. Meslings, dwelling, 2063 Graveley street, $2,000.

Victoria, B.C.

The Vancouver Island appropriations to be spent for road for the coming fiscal year are as follows: Alberni, $75,000; Comox, $85,000; Cowichan, $35,000; Esquimault, $65,000; Nanaimo City, $13,000; Newcastle, $26,000; Saanich, $10,000; The Islands, $30,000; Jordan River road, $34,000; Vancouver Island Trunk road, $30,000. In addition to the foregoing the supplementary estimates for work ending March 31st of the present year include: Alberni, $4,000; Cowichan, $2,000; and Esquimault, $11,000. The total amount to be spent on roads in the province is $2,842,000. Added to this must be the appropriation set aside for bridges throughout the province, which comes to a total of $858,500, and a total of $406,900 appropriated roads, streets, bridges and wharves in the supplementary estimates, making a grand total to be spent on roads in the province of $4,107,400. Of this total, as is shown, Vancouver Island has secured probably upwards of half a million dollars.

Winnipeg, Man.

Tenders addressed to The Standard Trusts Company, assignees of The Lake Winnipeg Lumber Company, Limited, will be received until March 20th for the purchase of timber, sawmill, steamer, etc., etc.

Recent building permits include: H. Adams, blacksmith shop on east side of Langside, $3,000; Ed. Noe, four dwellings on north side Rosser avenue, $12,000; W. A. Cameron, dwelling, west side Horne, $4,200; J. W. Alderson, dwelling, east side Lipton, between Ellice and Sargent, $2,000.

New Companies

Shawinigan Pulp and Paper Company, Shawinigan Falls, Que., capital, $100,000, incorporated. Incorporators, Jos. L. Marchesseault, merchant; J. E. Thibeaudeau, mnfr., Shawinigan Falls; J. Boivin, merchant.

Three Rivers, and E. Thibeaudeau, photographer, Shawinigan Falls.

George Thomson Lumber Company, Limited, Toronto, incorporated, capital, $100,000. Incorporators, George Thomson, Goderich, lumber dealer; and F Thomson, Southampton, lumber dealer.

George Rathbone, Limited, Toronto, capital, [illegible], incorporated to manufacture, etc., and deal in saw logs, shingles, etc. Incorporators, G. Rathbone, manufacturer; J. E. Rathbone and C. Marshall, all of Toronto.

The Herod Machine and Motor Company, Limited, Brantford, Ont., incor-

(Continued on page 31)

Tenders and For Sale Department

To Contr actors

[illegible] [illegible] [illegible] [illegible] at the office of the [illegible] School of Mines, Kingston, up to 6 p.m. of Friday, March 10th, for the several [illegible] [illegible] required for the erection and completion of the New Building for the Governors of the School of Mining and Agriculture.

Plans and specifications may be seen at the University and at the office of the undersigned.

The lowest or any tender not necessarily accepted.

POWER & SON, Architects,
[illegible] Merchants Bank Chambers, Kingston.

Tenders for
Cement Walks
and
Concrete Curb and Gutters

[illegible] Board of Works of the Town of Berlin will receive tenders addressed to A. H. Millar, Town Clerk, up to **March 2nd next**, for constructing cement walks, and concrete curb and gutters during the year **1911**. Specifications may be seen at the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

H. A. DIETRICH,
Chairman.
[illegible] 17, 1911 8-9

For Sale — Second Hand

No. 8 Austin Gyratory Crusher.
No. 6 and No. 3 Austin complete plant.
No. 3 Austin and 2 No. 6 Gates and No. 5 "B."
70-ton Vulcan Steam Shovel, 2-yard.
50-ton Bucyrus Steam Shovel, 1¾-yard.
Loco. Crane, with 1¼-yard Clam Shell.
Little Giant Traction Steam Shovel, 1¼ yard.
Hayward Orange Peel Buckets, 1 and 1¼-yd.
Concrete Mixers, Steam Rollers, Air and Steam Drills, Air Compressors, Locomotives, Dump Cars, etc.

All our goods we fully guarantee.
Send for our February Booklet.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

Tenders for Bridge

Tenders will be received by the undersigned up to 6 o'clock p.m., **Saturday, the 4th day of March, 1911**, for the erection of a reinforced concrete bridge, single span over the Clyde River at a point about 3 miles north of Lanark Village.

Bridge about 70 feet long.

Plans may be seen at the office of the undersigned at Lanark, or tenderers may submit their own plans and specifications.

Deposit of ten per cent. to accompany each tender, which will be returned if tender not accepted.

The lowest or any tender not necessarily [illegible]

Dated this 2nd day of February, 1911.

J. BOYD CALDWELL,
[illegible] of Roads and Bridges Com.
Lanark, Ont. 6-9

Tenders Wanted

The Town of Petrolia intends to construct about 6,000 square yards of pavement, and about 2,500 lineal feet of concrete curb and gutter combined, and invite tenders for Vitrified Brick, and any other kind of pavement.

Parties tendering must enclose a specification of the pavement they purpose laying along with their tender.

Tenders to be placed with me on or before 5 p.m., **Monday, March 20th, 1910.**

Any tender not necessarily accepted.

9-10 J. McHATTIE, Town Clerk.

City of Toronto

Civic Car Lines

Tenders for Rail & Ties

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, April 4th, 1911**, for delivery of Thirteen hundred and forty (1340) tons of open hearth steel rail, 80 lb. section, also thirty thousand (30,000) untreated wood ties, white cedar preferred, although other woods will be considered.

Envelopes containing tender must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained upon application to the office of the City Engineer, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor)
Chairman, Board of Control.
City Hall, Toronto, Feb. 23, 1911, 9-11

RIDEAU CANAL

Notice to Contractors

Sealed tenders addressed to the undersigned, and endorsed (a) "Tender for Timber," or (b) "Tender for Timber and Plank," will be received at this office until 16 o'clock on **Monday, the 20th March, 1911**, for the supply and delivery of British Columbia or "Douglas Fir" dimension timber and also for other Lumber and Timber required for use on the Rideau Canal for the year 1911-1912.

Specifications, Bills of Timber and full information can be obtained from the Purchasing Agent of the Department of Railways and Canals, Ottawa, on and after this date.

The lowest or any tender not necessarily **accepted.**

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa,, 22nd February, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 9-10

City of Moose Jaw, Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A" and "Tender B" will be received by the undersigned City Clerk until 8.30 o'clock p.m., on **Monday, April 10th, 1911.**

Any tender received after the above-stated time will be declared informal.

Contract "A."

Supplying material for and constructing a Sewage Disposal Plant complete, including Pump House, Sedimentation Tanks and Percolating Filter, also the supply of materials for and the laying of a Trunk Sewer and Water Main.

Contract "B."

Supplying two Electrically Driven Centrifugal Pumps and Auto Starters complete with all piping, connections, etc.

Plans and specifications for Contract "A" may be obtained from the City Engineer, Moose Jaw, upon receipt of a marked cheque for the sum of $25 to be held until the return of plans and specifications, and for Contract "B" plans and specifications will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 18th, 1911. 9-14

City of Moose Jaw, Saskatchewan

SEWER AND WATER EXTENSIONS

Sealed tenders endorsed "Tender 28," "Tender 29," "Tender 30" and "Tender 31," will be received by the undersigned City Clerk until 8.30 o'clock p.m. on **Monday, April 10th, 1911.**

Any tender received after the above stated time will be declared informal.

Contract 28.—The laying of approximately 30,700 lin. feet of tile pipe sewer, building manholes, etc.

The laying of approximately 29,700 lineal feet of cast iron water main, placing valves, valve boxes, hydrants, etc.

Contract 29.—The supplying of approximately:
29,600 lineal feet of 6-in. c.i. water pipe.
112 lineal feet of 4-in. c.i. water pipe.
132 6-in. cast iron **reverse curves.**
34 6-in. cast iron crosses.
72 6-in. cast iron tees.
29 4-in. off 6-in. cast iron tees.
28 4-in. cast iron tees.
95 6-in. cast iron plugs.

Contract 30.—The supply of approximately:
26,600 lin. feet of 8-in. vitrified tile sewer pipe
5,225 lin. ft. of 10-in. vitrified tile sewer pipe.
1,100 lin. ft. of 12-in. vitrified tile sewer pipe.
25 8-in. tees.
75 6-in. tees.
25 8-in. bends, 90 deg.
100 6-in. ⅛ bends, 90 deg.
25 8-in. stops.
25 10-in. stops.
400 4-in. to 6-in. increasers.

..Contract 31.—The supply of approximately:
65 6-in. 3-way hydrants.
147 6-in. gate valves.
29 4-in. gate valves.
150 6-in. valve boxes.
29 4-in. valve boxes.
88 manholes, frames and covers.

Plans and specifications for Contract 28 may be obtained from the City Engineer, Moose Jaw, and from the offices of the Canadian Engineer at Toronto and Winnipeg.

Plans and specifications for Contracts 29, 30, and 31 will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 24, 1911. 9-14

Miscellaneous

Advertisements under this heading two cents a word per insertion

WANTED Construction Engineer having several years experience in concrete and general construction work. Apply to Smith, Kerry & Chace, Confederation Life Building, Toronto, Ont., by letter only, stating experience fully. 9-9

AGENTS WANTED—Large American firm manufacturing a complete line of lineman't tools, and portable saw rigs for builders, contratcors and lumber yards wants Canadian representatives. For particulars apply, Box 221, Contract Record, Toronto, Ont. 8-9

City Engineer Wanted

For city of 15,000 population. Considerable permanent street work to be done. Apply, stating experience and salary wanted, Box 230, Contract Record, Toronto, Ont. 9-10

New Companies

(Continued from page 29)

porated, capital, $40,000. Incorporators, C. H. Herod, C. J. Harris, manufacturers, and C. Cook, broker, all of Brantford, Ont.

Canadian Automatic Gas Company, Limited, Toronto, incorporated, capital, $250,000. Incorporators, C. F. Ritchie, barrister; J. H. Oldham, student, both of Toronto.

The Inwood Rural Telephone Company, Limited, Inwood, Ont., incorporated, capital, $25,000. Incorporators, J. H. Morrison, W. R. Dawson, and J. Brown, merchants, Inwood.

Owens Lumber Company, Limited, Montebello, Que., incorporated, capital, $100,000. Incorporators, N. Dickson, Notary Public, A. Holden, and James Buchanan, accountants, all of Montreal.

Lake Superior Paper Company, Sault Ste. Marie, Ont., incorporated, capital, $8,000,000. Incorporators, Thos. Gibson, barrister; A. Taylor, secretary, and N. D. Bayly, clerk, all of Toronto.

Montreal General Contracting Company, Limited, Montreal, incorporated, capital, $200,000. Incorporators, E. G. Evans, civil engineer; R. Moffat, contractor; G. G. Hyde and W. G. Pugsley, advocate, all of Montreal.

National Brick Company of Laprairie, Limited, Montreal, incorporated, capital, $2,000,000. Incorporators, C. G. Greenshields and E. R. Parkins, advocates, both of Montreal.

Business Notes

P. Garneau & Co., contractors, Quebec, have registered.

S. McCormack, plumber, Ottawa, is stated to have assigned

The Belding Lumber Co., Ltd., Toronto, winding-up order granted.

H. Cauchon, contractor, Beauport, Que., is reported to have sold assets.

Pepin & Caron, contractors, Hull, Que., are stated to have sold assets.

Lambert & Frere, lumber merchants, Montreal; J. H. Lambert & J. N. Lambert, have registered.

The Canadian Municipal Supply Co., Montreal, Que., O. H. Smith, have registered.

The Co-operative Bit & Tool Co., Mystic, Que., are reported to have dissolved.

Kilmer, Pullen & Burnham, Limited, Montreal, F. Pullen, president, have registered.

J. Long & Co., plumbers and tinsmiths, Welland, are reported to have assigned.

Jas. C. Claxton & Son, builders and contractors, Toronto, are reported to have assigned.

Canadian Storage Battery Works, Limited, Winnipeg, Man., is reported to have assigned.

J. Willis & Sons, contractors, Montreal, C. J. Wills, A. S. Wills and J. F. Wills, registered.

Bourque & Pichette, contractors, Montreal, Que., Chas. E. Bourque & A. Pichette registered.

J. Messier & Son, East Farnham, car makers, J. Messier, jr., and Eugene Messier, have registered.

Cabana & Comeau, Montreal, Que., contractors, Montreal. H. Cabant and P. Comeau, registered.

L. Villeneuve & Cit, Ltee., lumber merchant, Montreal, L. Villeneuve, president, have registered.

The Atkins Storage Battery Company, Vancouver, are reported to have assigned.

Blais & Frigon, cement work, Victoriaville, Que.; Alfred Frigon and J. E Blais have registered.

Blackadar & Blackadar, manufacturers lumber and general store, Millville, N.S., have formed partnership.

The Canadian Iron & Metal Co., Mont-real, are registered as H. Levine, P. Lippenholtz and M. Butler.

Canadian Storage Battery Works, Ltd. (Estate of) Winnipeg, are reported to be advertising assets for sale by tender.

A. H. Bennett, brass foundry, Vancouver, is reported to have assigned to Canadian National Investment, Limited.

Nepisiguit Lumber Co., Ltd., Bathurst, N.B., mfrs. lumber and shingles, E. P. Mackay and Geo. Gilbert, permanent liquidators.

Under the name of the Canadian Northern Branch Lines Company, the C. N. R. is applying for incorporation with power to build eighteen branch lines in Manitoba, Saskatchewan and Alberta.

The Cowan Construction Company, Limited, of Winnipeg, is reported to be applying to the Lieutenant-Governor-in-Council for authority to change the name to the Union Construction Company, Limited.

It is understood that the company will undertake an important contract on the Canadian Northern main line between Pembina river and the Rocky Mountains, in addition to other contracts in the prairie country.

Two of the original members of the company have sold out their interests to J. J. Merry and Joseph M. Mackenzie.

Mr. Mackenzie is a son of Sir William Mackenzie, president of the Canadian Northern Railway. F. W. Tisdale and Frederick Fox are also named on the directorate of the reorganized company.

It is understood that the Canadian Pacific will do a lot of work in the Northwest this year. The double-tracking to Brandon will be completed and a new line built into Strathcona from Sedgewick, a distance of about ninety miles. The superstructure of the bridge at Lachine, near Montreal, will be used for the new bridge at Outlook Crossing on the South Saskatchewan river.

An international trunk line highway between New York and Montreal may soon be established. The ways and means of securing the Canadian end of the highway were discussed by an enthusiastic gathering in Montreal recently. The New York to Rouse's Point Road is expected to be started this year, a bill having passed the State Senate this winter, making the sum of $1,200,000 immediately available to finish the remaining stretches of the line.

The British Columbia Gazette gives notice of the incorporation of the following companies: The Realty Fruit and Lumber Company, Limited, capital, $500,000; Island Lumber Company, Limited, capital, $100,000; Taylor Brick Company, Limited, capital, $50,000; The Wolverine Company, Limited, capital, $75,000; The Granite Creek Lumbermen, Limited, capital, $65,000; Western Canadian Lumber & Fuel Company, Ltd., capital, $150,000; Home Loan & Contract Company, Limited, capital, $300,000; Nanaimo Brick & Coal Company, Ltd., capital, $200,000; Essex Shingle Company, Ltd., capital, $10,000; Canadian Crude Oil Co., Ltd., capital $750,000; The Canadian Ideal Gas and Light Co., Ltd., capital $5,000; The Interior Lumber Company, Ltd., capital, $20,000; Iowa Lumber and Timber Company, Limited, capital, $250,000; Oliver Scrim Lumber Company, Limited, capital, $100,000; Victoria-Vancouver Lime and Brick Company, Limited, capital, $100,000; The Realty Fruit and Lumber Company, Limited, capital, $500,000; Island Lumber Company, Limited, capital, $100,000; Taylor Brick Company, Limited, capital, $50,000; The Wolverine Company, Limited, capital, $75,000; The Granite Creek Lumbermen, Limited, capital, $65,000.

The Canadian Pacific Railway have announced their intention to spend over $250,000 in improvements to their lines in London, Ont., this summer. The improvements include the building of a new station and round houses and the construction of new yards. The appropriation for this work has already gone through, and in preparation for the starting of building operations the houses on the site of the sation are being moved away. Other improvements in the vicinity of London include the renewing of the wooden bridges between Toronto and Windsor with permanent steel and cement structures. Over half a million dollars has been set aside for this work by the C. P. R.

Construction of Highway Bridges and Culverts*

The past year has been a particularly favorable one on account of climatic conditions for construction work of all kinds. Particularly is this true of culvert and bridge work. Undoubtedly concrete was more widely used for this purpose during 1910 than in any previous year. There is a general movement toward the adoption of this material for use in structures of this character. Little advertising or persuasion is necessary now to convince township or country road officers that the best material for their waterways is concrete.

In general, the types in use now are circular culverts built over collapsible moulds; slab top or box culverts; arches; I-beam construction, including I-beams supporting a concrete floor, and I-beams piling, with concrete filled between for abutments or side walls. In addition, steel bridges with concrete floors are used to some extent.

The types of bridges and culverts recommended by the Highway Commission are as follows:

First. Round culverts built over collapsible moulds with a small amount of longitudinal reinforcements, including all sizes up to a 36-inch diameter.

Second. Box culverts or slab bridges from 2 to 20 feet span.

Third. Reinforced concrete arches from 8 feet span up to 100 feet, used where the foundation and head room are favorable.

Fourth. Pony truss bridges, from 30 to 80 feet span, with reinforced concrete floors.

Fifth. Reinforced concrete girders of either the through or deck type from 25 to 50 feet span.

There have been no notable failures of concrete work in the state during the past year. There are, however, we believe, some serious mistakes being made that will eventually result in failures. The mere fact that a bridge or culvert is standing is no reason for assuming that it is a safe kind of structure to build.

Among the costly mistakes that have been most frequently made is that of low bidding. Concrete work is not and never will be cheap work, and concrete workers should not attempt to compete in first cost with bridges of other less permanent material except under very favorable circumstances. The fact that concrete work well done is permanent, entailing practically no maintenance charges, should be sufficient to off-set in the minds of public roads officers, the somewhat higher investment. We have found that bids on plans prepared by the Highway Commission and on which the competition has been strong, have almost invariably been below the estimated cost. On the other hand, it is apparent that contracts have been taken at a loss by many concrete contractors, because of the rank favoritism that prevails in so many counties or on account of the conditions that have been imposed upon contractors, which have effectively eliminated competition. Iowa can and should offer an open field to the cement contractors of the state. Under existing methods and conditions, this field is closed. In probably 75 per cent. of the counties of this state there is not such a thing as actual competition in the bridge business. We are very much in need of some laws that will give all men who wish to do public work, and are capable of doing good work, an equal chance.

In response to the demand for concrete bridges the steel I-beam bridge has been encased in concrete and used extensively in some counties. This is a needless waste of steel, as a few rods of steel would reinforce the abutments far more effectively and the prices that have been paid for this material are far in excess of the market value. When used for floors, the I-beam construction is not economical, as the I-beams must carry their own weight plus that of the concrete floor plus the loads that pass over them. This is not reinforced concrete construction, and if the I-beams are sufficiently large to take the superimposed loads, the cost complete with concrete floor would be considerably more than the slab, reinforced with steel rods.

There are many mistakes made in concrete construction, due to incomplete knowledge of the man handling the material or insufficient supervision. Among these mistakes are the misplacing of reinforcing steel. Careless placements of the steel reinforcing is a really serious matter, for in the use of the slabs and their sections, a minimum thickness is nearly always used. If, then, the steel is misplaced even one-half inch from its figured positions, the calculated stresses will be greatly increased and if in a thin section the steel is misplaced one inch, then the stresses induced may cause serious cracks or even failure.

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*Extract from a paper read by T. H. Macdonald before the Iowa Association of Cement Users.

At Iberville, Que., operations have been resumed at the plant of the Norcross Brothers Company. About 125 hands are employed.

The Bricklayers and Masons' Union of Vancouver, B.C., has notified the city officials that its new scale of $6 for an 8-hour day will go into effect on April 1st.

The price of common brick is on the increase at Victoria, B.C. Last year's figure was $12 a thousand, but two tenders submitted recently to the city for the year's supply were both for $12.75 a thousand. The contract was equally divided at this price.

On February 16th, Mr. C. H. Mitchell gave an interesting address before the Engineers' Club of Toronto, on the Ontario Power Company's conduit at Niagara. The address was illustrated by a number of excellent views showing constructional progress.

Mr. G. R. Conway has been appointed chief engineer of the B. C. E. R. (Vancouver), with charge of the engineering staff and subsidiary companies. Until recently Mr. Conway was chief engineer of the Monterey Subway Light & Power Company and the Monterey Waterworks and Sewer Company, Mexico. Among important contracts of which he had charge previously may be mentioned the installation of the waterworks system at Aberdeen, Scotland.

Regina, Sask., anticipates an exceptional demand for unskilled labor this season. The city has a very heavy construction problem to carry out. Among the important items may be mentioned the construction of the street railway, the completion of the parliament buildings, the G. T. P. shops anad railway lines, the Fair buildings, C. N. R. and C. P. R. buildings, and scores of residential and commercial structures.

Mr. F. F. Tye, of Toronto, is now in Ottawa, engaged with City Engineer Ker in preparing a report on railway entrances into the city. The report, after approval by the city council, will go to the Board of Railway Commissioners.

Asbestos-Cement Shingles

"The Roof That Outlives the Building"

It's the easiest thing in the world to interest a client in a roofing that needs no repairing or painting—especially if he has had experience with an old time roofing.

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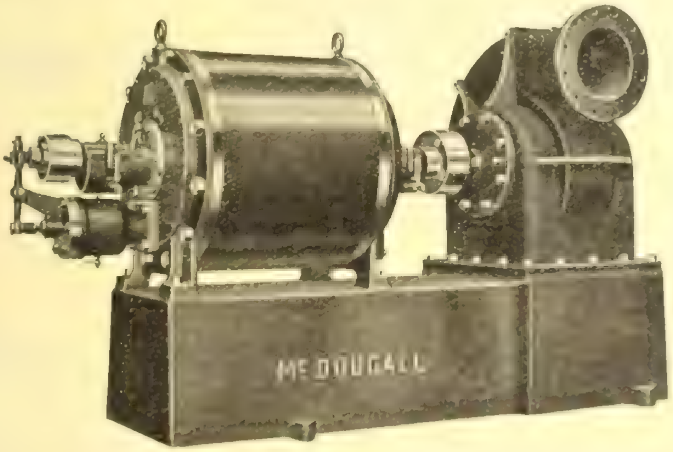

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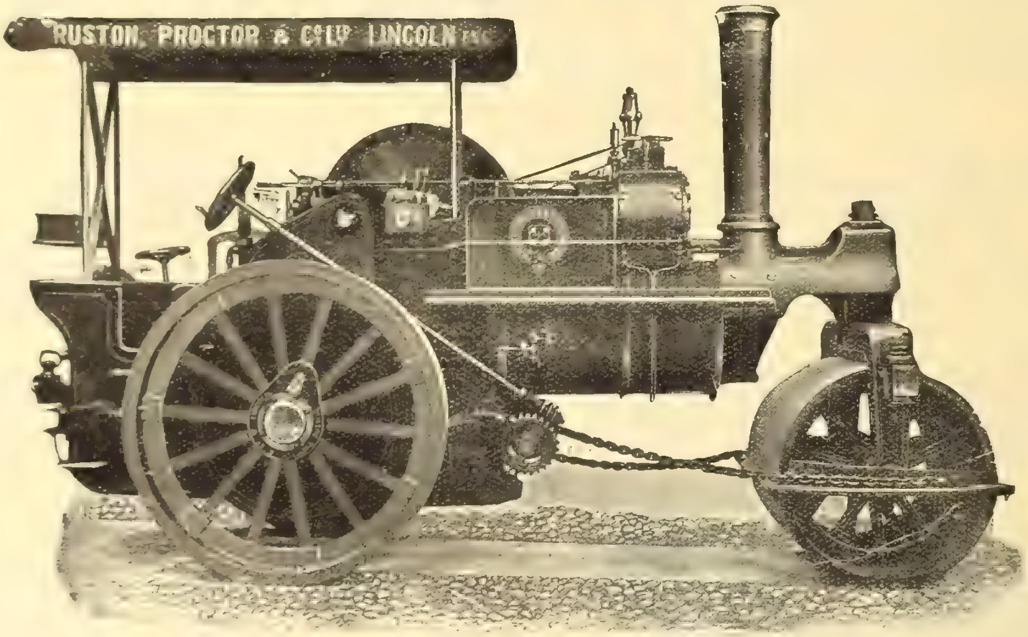

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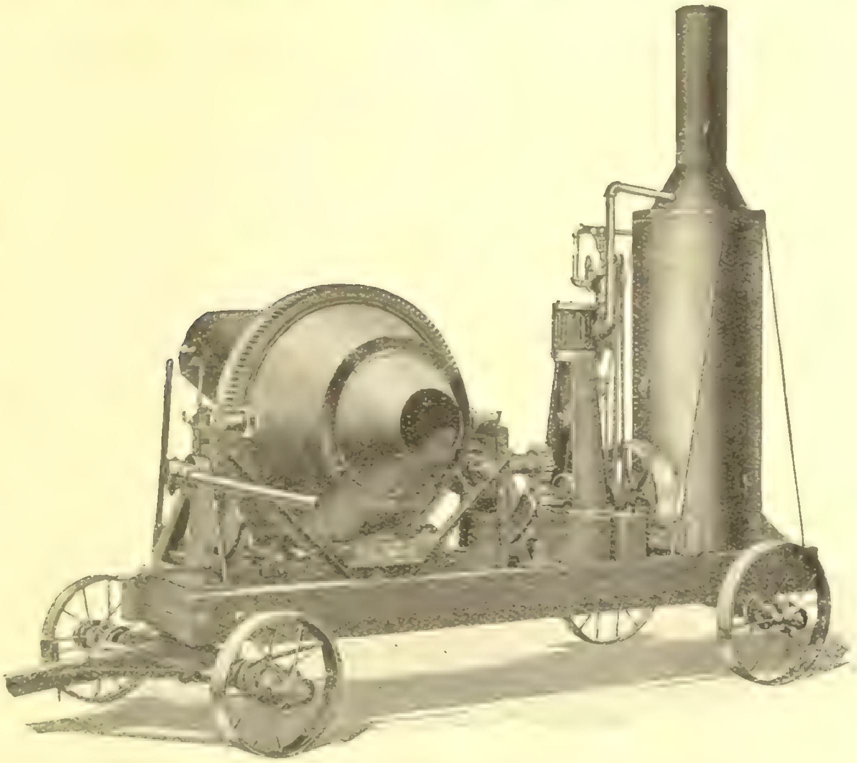

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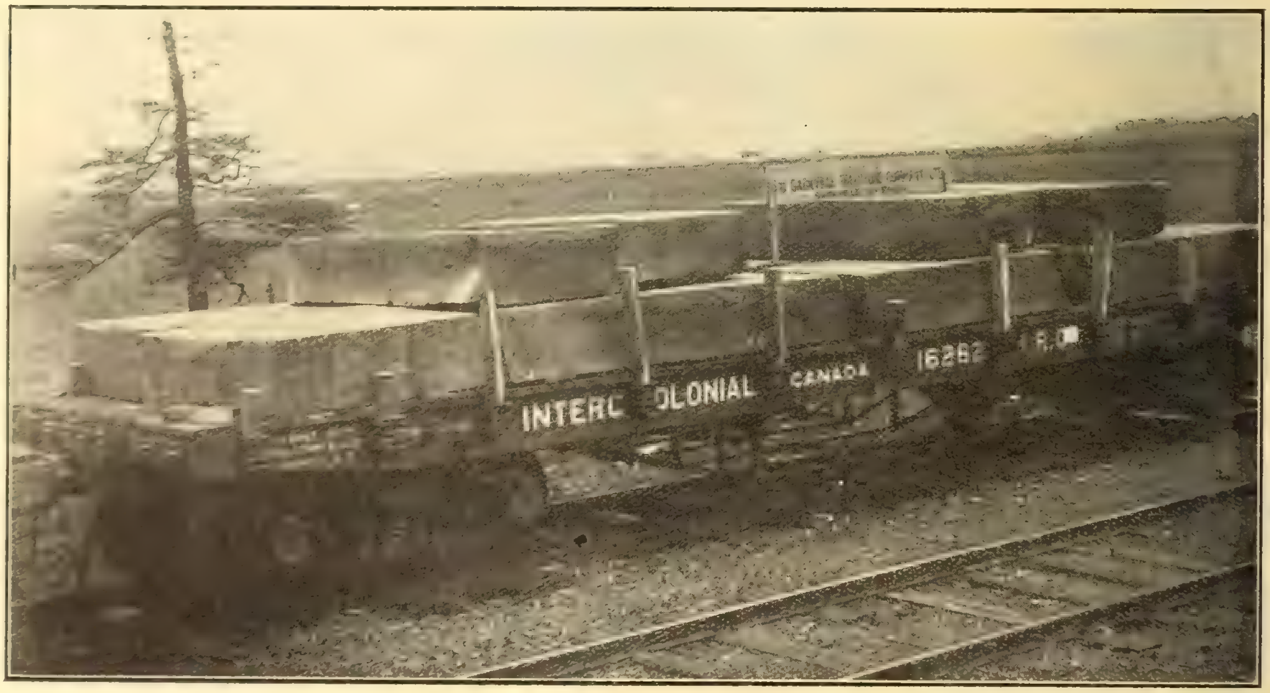

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Contract Record

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Aldermanic Ignorance

In spite of the fact that their city engineer submitted a report in which he showed that a saving had been effected for the city last year by employing the contract system, the aldermen of Victoria, B.C., decided upon starting out on the city paving programme this season with day labor. There was considerable discussion on the point, and the Mayor suggested undertaking two batches of work under similar conditions, doing one by day labor and one by contract. The majority of the aldermen failed to understand why the city should not do as well as the contractors.

Evidently some kind of an educative campaign is needed in Victoria, B.C., to expound the elementary principle of adaptability, and to show the worthy aldermen that because, for instance, a man is capable of running a farm properly, it does not follow that he would make a neat job of cutting out a pair of pants. This argument is perhaps rather far-fetched in its present application, but certain it is that either the city engineer will be an expert in his own particular profession or he will be capable of both designing and executing his work—and making a botch of the whole thing.

The Lowest or any Other Tender not Necessarily Accepted

While it is generally conceded that the above provision is necessary for the protection of municipal authorities and others, the rejection of the lowest bid is a frequent source of trouble and misunderstanding. A brief discussion of the question at this time will perhaps come opportunely. We agree that the power not to accept the lowest bid should always be taken, for there are men of doubtful standing in the contracting as in every other industry, but there are times when this power is used without rhyme or reason, to the great detriment of the honest contractor.

Our attention has been called to a recent case of this kind, and such cases are said to be far too frequent. The case is that of a local authority preferring a local contractor over another bona-fide and lower tender. In the particular case which has led to these remarks there does not exist the slightest ground for suspicion of evil practice; but we are fully convinced that in the majority of cases the transactions will not bear the light of day. It is unjust to those who go to the expense of tendering if the authority from the first intends to favor a local man if he happens to be near the mark. Without specializing the particular persons and localities, let us see how contrary to true business such favoritism must be. A certain authority advertises for tenders; the work is important, and worthy the consideration of any large contractor. Good firms go thoroughly into the matter, and, as in the present case, one of the members of the firm, with a competent engineer, visits the place to obtain the fullest information. The tender is sent in and proves to be the lowest submitted; references are duly furnished, and prove to be satisfactory. Yet in the end this tender is passed over in favor of a local man. Upon writing to ascertain the reason for this, the firm receives a letter to the following effect:

> re——— Improvements.
>
> Dear Sir:—
>
> I have received yours of the — inst. In reply, I must refer you to the conditions stated in the advertisement inviting tenders, viz., that the council did not bind themselves to accept the lowest or any tender.
>
> At the same time, I may venture to explain that in accepting Mr. ——'s tender the committee were mainly guided by the consideration that, having regard to the small amount in difference between his tender and yours, due regard should be had to the claims of a local contractor.—
>
> Yours truly,

There is absolutely no logical consistency in reasoning of this kind. What is the limit of the difference that shall be taken into account? Why not word the advertisement for tenders: "That if the tender of the local contractor does not exceed the lowest bona-fide tender sent in by more than 10 per cent. the tender of the local man shall be accepted?" Of course, under such conditions no outsider would tender, and the locals would have it all their own way. A still more serious difficulty arises than that of the loss of work. Other local authorities receiving tenders from the firms passed by are apt to pass them by also; not because they can give any valid reason for so doing, but simply because one authority passed them by for no assignable reason. Firms of repute do not like to be served in this manner, and they may justly claim to have something to say in the matter. Without a word of warning, they go to considerable trouble and expense solely in the end to be put out of court because of not being represented on the spot.

The correspondent who calls our attention to this matter contends that, all things being considered, as much, or more, money is spent in a particular place when an outsider gets a large contract as when a local man gets it. We are hardly inclined to go so far as this, though at first sight it seems somewhat reasonable. The local contractors are supposed to find work for their men as heretofore, and other men to be brought for this particular work. We must point out that the local men, if they have sufficient work for their ordinary staff, would also have to increase their number of workmen to meet extraordinary demands. In reality this is only a side issue, and has nothing to do with the merits of the case. We hold that the lowest tender should, without hesitation, be accepted, when it is a bona-fide tender sent in by a responsible firm

The Preparation of Engineering Contracts

Accurate Description of Work in Specification Essential to Success of All Undertakings — Contradictory Clauses and Other Sources of Trouble

By Wm. H. Bailey

A contract is defined by Blackstone as "An agreement upon sufficient consideration, to do or not to do a particular thing." Other definitions are: "A transaction in which each party comes under an obligation to the other, and each reciprocally acquires a right to what is promised by the other," and "A convention by which one or more persons obligate themselves to one or more persons, to give, or to do or not to do something."

Contracts may be written or in parol (i.e., verbal or unwritten) or partly written and partly in parol, but in most states some contracts must be in writing and generally it is safer to have the contract in writing and thus avoid disputes. Where the parties have reduced their contract to writing, the written contract cannot be varied or modified by a prior or contemporaneous parol agreement , but if through fraud or mutual mistake the parties have failed to correctly embody their agreement in the written instrument a court of equity will, upon a satisfactory showing, reform the contract so that it will express the real intention of the parties.

The contract should specify:

1. The parties;
2. The thing to be done;
3. The time and place for doing the thing to be done;
4. The price or consideration for the thing to be done;
5. The time and place for paying the price or consideration.

To constitute a contract there must be an agreement directly contemplating and resulting in an obligation and the agreement must be enforceable in law. Some of the essentials are:

1. There must be distinct communication by the parties to one another that it may effect the legal relations of the parties and be an act in the law, therefore:
   a. It must be in the form required by law;
   b. There must be a consideration when required by law;
3. The parties must be capable in law of making a valid contract;
4. The consent expressed in the offer and acceptance must be genuine;
5. The object which the contract proposes to effect must be legal.

Engineering contracts are usually in writing and every important contract should be reduced to writing and every subsequent amendment or modification of it should be in writing. A written contract may be all contained in one paper or may be made up of two or more instruments; it may consist of one formal instrument signed by the parties or it may be made up of letters or other written communications in which a proposal is made on one side and accepted on the other.

An important part of every engineering contract is the specification. This may be in whole or in part written in the body of the contract, or, as is generally the case, is contained in a separate writing or writings and by the reference made a part of the contract.

The Contract and the Specification.

When the contract consists of two parts, one of them, signed by the parties and containing the formal elements, is usually called the "contract," and the other attached or referred to in the first and describing the work to be done or thing to be furnished is usually called "specification (or plan and specification)." The two constitute the contract in the full legal sense.

That part which we call for convenience "the contract" is usually prepared by a lawyer; perhaps it may be copied from a form found in a text book or be a printed blank, but the original was no doubt prepared by a lawyer. A careful engineer will examine it carefully and if necessary ask advice or explanation regarding matters in it which he does not understand or which seem to be obscure or not to express the intention of the parties.

That part usually called the "specification" should be prepared by an engineer. Like the lawyer's work it may be copied from a text book or be a printed blank but nevertheless if it is worth using it should have been prepared originally by an engineer.

When the contract and the specification are brought together they should be carefully compared to see whether they are in conflict and it will be well to provide either in case of conflict, although generally the contract so called should be construed as more authoritative since it was last prepared and had generally received more personal attention from the contracting parties than the specifications.

A specification has been defined as "A written statement containing a minute description or enumeration of particulars." A good definition of an engineering specification is: "A concise, accurate and detailed description of the work or structure to be built, together with a concise, accurate and detailed description of the materials and their method of fabrication and to some extent of the methods of construction of the work or structure." Maps, plans and drawings are often a part of a specification and are sometimes a necessary part.

The Lawyer's Share.

As explained above, the part of an engineering contract generally called the "contract" usually is and ought to be the work of a lawyer; that part of such contract called the "specification" or "plan and specication" usually is and in all cases ought to be the work of an engineer.

Not only is the specification usually a necessary part of an engineering contract but it is the most important part of it. If the specification is skillfully drawn, it will be possible to get a good job with a faulty contract, but with an improper specification, a faulty job generally results. In every engineering contract, therefore, both in preparing the contract and in carrying out the work contracted for, the engineer's work is of the first, the greatest importance.

The care and skill with which you plan the work upon which you are employed and the fidelity with which you prepare the specification under which the work is to be done, or interpret the specification and see that its provisions are carried out, if you are superintending the work, will soon determine your place in your profession. If the specifications you prepare prove to be unreliable or if you are found to be unable to properly interpret properly prepared specifications you will soon be working at something besides engineering, or if you continue in the profession it will be in some inferior and ill-paid position.

Preparing the Specification.

In preparing a specification it will be allowable, and is often the best practice, to copy approved forms; some of the forms found in text books, in printed blanks and in the reports or proceedings of engineering societies or in the manuals of manufacturers, embody the very best practice and the latest and best experience. But do not copy a clause or section from any form without carefully reading it to see that it does not contain something unnecessary in the work in hand or something which ought to be changed on account of some special or local condition.

It would not be possible to lay down all the rules which ought to be observed in preparing plans and specifications for any and all kinds of work or even for particular classes of work, but there are a few rules which it will be well to bear in mind. Remember, though, that there are exceptions to all rules.

1. Whenever an article has been standardized it will be generally best to specify standard form or quality rather than to specify some special form or quality which will be no better, while increasing the cost.

2. Do not include any clause which is so drawn that the engineer or inspector can, if he so wish, cause great monetary loss to the owner by allowing inferior work or material than was contemplated. Such a clause would, as to a contractor, be one which required everything to be furnished to the satisfaction of the engineer or inspector after all had been specified of certain brands or qualities or as to an owner be one which after fully specifying brands or qualities would permit a substitution of something else satisfactory to the engineer of inspector.

3. All requirements should be sincere and not made with the view to becloud the minds of bidders. So too, care should be exercised to avoid contradicting clauses which will tend to obscure the intent.

4. The specifications should not on the one hand be so general that no two bidders will bid on the same thing nor or the other hand be so exacting that it will be difficult to comply. A clause may on one hand be so general that inferior work can be done, and on the other so exacting that it will be practically impossible for the contractor to comply and still not secure a better structure.

5. The specifications should, as far as possible, leave the method of doing the work to the contractor. A contractor may have methods of doing work different from those known to the engineer which will enable him to bid lower than his competitors.

6. Care should be exercised not to require anything which, while it may add to the cost to the contractor, will not add to the useful value of the work, and not to specify something which the contractor will not be expected to do or furnish.

7. Clauses which favor one manufacturer should ordinarily be avoided.

Some things to be avoided in preparing a specification may be illustrated by specific instances which have come to my notice.

In a specification for paving it was provided that the cement concrete should be made of cement, river sand and river gravel. No river sand or river gravel could be had unless it was brought in on cars but there was near by bank sand and bank gravel of excellent quality which had always been used. When a bidder enquired of the engineer he was told that the bank sand and bank gravel were intended and the matter was provided for in the contract. The specification had been copied from a form used by the engineer in another locality.

In a sewer specification it was provided that where it was necessary to lay the pipe in water a jute gasket should be well rammed into the joint. In the trial of a suit the engineer admitted on the witness stand that he saw sewer laid in water without any jute gasket and that he knew that none was used on the work though he had certified that it was done according to the specification. He said, however, that it was not customary to use jute gasket and he had not intended to require it, but in preparing the specification he had copied the clause in question from some old form.

I have seen a specification which called for limestone in a locality where a better stone but no limestone was abundant, and much cheaper, and on the other hand I have seen a specification which called for trap rock in a locality hundreds of miles from any trap rock and where limestone was the material generally used. In such cases either there must be an increase in cost to the owner without better work or a material must be substituted for that specified.

I have seen specifications for steel beams, etc., which described a material which differed from standard forms and would have to be specially made for the work when standard forms and sizes having as great or greater strength could be furnished at much less price.

Novel Concrete Tank with Dome-shaped Bottom

The University of Arizona is located at Tucson, Ariz., but outside of the corporate limits of the city. The water required for use on the campus, including that which is used for irrigation, is supplied by a pumping plant located upon the grounds. The water which is used for irrigation is pumped directly into the ditches, supplying the various parts of the grounds, and the water which is required for other uses is pumped into an elevated tank, connected with the water mains. The tank now in use is a reinforced concrete structure 40 ft. in height and 25 ft. in diameter, with a capacity of approximately 60,000 gallons. The water tank consists essentially of a vertical cylinder and two domes. The lower half of the vertical cylinder forms the tower which supports the tank proper, and the upper half of the cylinder forms the outer wall of the tank. The lower dome forms the bottom of the tank proper, and the upper dome forms the roof of the structure. A projecting band encircles the cylinder along the springing line of each dome, each band containing the steel reinforcement required to resist the adjacent dome. The thickness of the cylindrical shell is but 4 inches, and it has no buttresses to assist in carrying the load. The thickness of the lower dome is 3 inches, and of the upper dome 3 inches, except near the springing lines, where the thickness is increased.—Engineering News.

Concrete Abutments for Steel Bridges

Principles of Design from the Practice of the Illinois Highway Commission — Diagrams for Estimating Amount of Concrete and Cost

By H. E. Bilger *

To design economically a retaining wall and insure stability is a problem that is not susceptable to accurate mathematical solution. A great many formulas have been advanced that deal with earth pressure under different conditions. But the formulas are necessarily based on assumptions more or less unknown, and consequently for ordinary cases there is little or nothing to be gained in applying a supposedly rational formula to determine the stability of a retaining wall against overturning.

For plain abutments up to 25 ft. in height the practice of the Illinois Highway Commission is to make the width of the base 33 per cent. of the total height (or 25 per cent. where the foundation is to be rock or shale). Our plain concrete abutments rest on a concrete footing 18 ins. thick and projecting 9 ins. horizontally beyond the front and the back of the wall proper. The back of the wall is made vertical, primarily to throw the centre of gravity of the wall farther away from the toe, and secondarily for the sake of appearance.

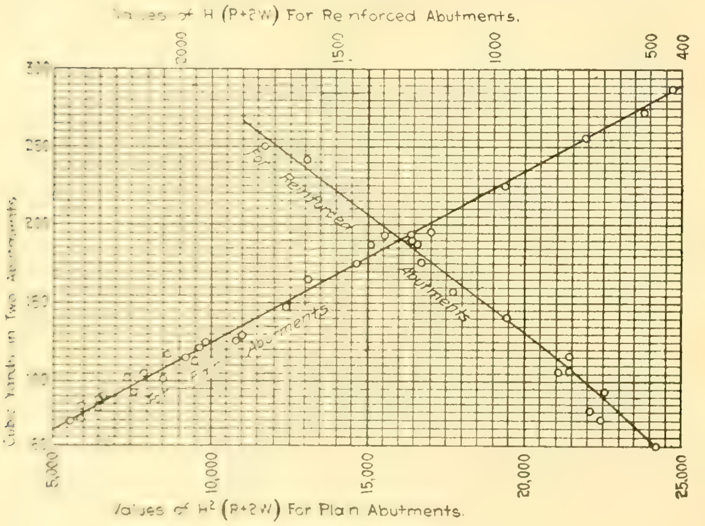

Fig. 1

At the end of the wing the width of the footing is 33 per cent. of the height of the wall at this place, but with a height less than 13 ft. (when we use the customary 9-in. horizontal offset for the footing), the width of the wall at the top of the footing will be slightly less than 25 per cent. of the height. In these cases the width of the wall at the top of the footing is made 25 per cent. of the height above the top of the footing, and the horizontal off-set of the footing is adjusted until the width of the footing is 33 per cent. of the total height. Wing walls are made 12 ins. wide on top, and the total width of the abutment proper at the top usually varies from 20 to 32 ins., depending upon the size of the shoe that is built for the superstructure. Of this top width, 8 ins. is in all cases used for the parapet wall.

For the reinforced buttress type of abutments it is the practice to make the width of the base 33 per cent. of the total height for heights up to 30 ft. Needless to say that the stability moment of the buttress wall is somewhat less than that of the plain or solid type of wall. This is due to the relative amounts of concrete in the two walls, but also because of the centre of gravity of the concrete in the buttress wall coming nearly to the toe of the wall. It is true that the difference in the weight of the two walls is very largely made up by the weight of the backfilling occupying the space between the buttresses; but this compensating factor is not sufficient to make the buttress wall as stable against overturning as the plain wall when the ratio of base to height is the same.

To retain the same width of the footing of the buttresswall, so as to have the design of the two types consistent, it is considered that the anchorage of the wings to the main wall by the horizontal reinforcement is sufficient to make up for whatever difference might exist between the stability of the two types of walls. This anchorage is not considered, however, in cases where the angle between the wings and the center line of the road is more than 45 degrees.

As with plain abutments, the width or the footing at the end of the rings is made 33 per cent. of the total height at that point. The footing depth is very frequently 18 inches, but this may vary some 6 inches either way, depending upon the design required for the particular case. The wall proper is made arbitrarily 12 inches wide at the top, but at the top of the footing it usually varies from 18 to 24 inches, depending upon the design as required by the conditions. Three buttresses 12 inches thick are used behind the main wall and occupy the full width of the footings that remains back of the wall. In the wings, the buttresses are placed some 6 or 7 feet c. to c., depending on the length of the wings. Three buttresses for each wing are commonly used.

The bridge work of the Illinois Highway Commission requires a personal inspection of the bridge site with the local officials, and almost invariably the officials expect that an estimate of the cost will be made at this time. Consequently, the engineer must be prepared to give an estimate that will closely approximate the one that is made from the detailed drawings. This is usually somewhat difficult, unless the time is taken to compute the number of cubic yards in the abutments.

For the purpose of determining off-hand the approximate number of cubic yards in a pair of concrete abutments, the accompanying diagrams have been prepared, and are applicable within the limits shown by the specific cases used. For plain abutments, 27 different designs were taken from the files of the Commission and the number of cubic yards in the two abutments of each design was plotted against H^2 $(R + 2W)$, where (H) is the total height of the wall, (R) the clear roadway of the steel superstructure, and (W) the length of one wing measured on the stream side of the wing. It will be noticed that the number of cubic yards in two abutments varies ap-

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* Assistant Engineer Illinois Highway Commission

proximately as the square of the height. The width (R) was taken as the clear roadway for the reason that this is the figure obtained at the preliminary inspection of the bridge site.

It will be noticed that the maximum variation from the line plotted is 8 cubic yards, while the average is about 3½ cubic yards. For a particular bridge site, suppose the distance from the crown of the finished roadway to the bed of stream should be 14 feet, and that the footing should be carried to a depth of 4 feet below the bed of the stream, making (H) equal to 18 feet. If the wings are each to be 15 feet long and the abutments are to carry a superstructure having a clear roadway of 16 feet, we have a value of 14,900 to be read off at the bottom of the diagram. It will be seen at once that there are 178 cubic yards of concrete in the two abutments.

The 27 abutments used in making this figure varied in height from 12 ft. 4 ins. to 24 ft. 3 ins., the average being 17 ft. 4 ins. The wings ranged in length from 5 ft. to 17½ ft., the average being 12 ft. 2 ins. The width of roadway varied from 14 to 18 ft., but was 16 ft. in the large majority of cases. The total width of the wall at the top varied from 20 to 32 ins., the average being 27 ins. In all cases, 8 ins. of this width is used as a parapet wall and comes to the top of the stringers in elevation, th eremaining portion of the wall stopping in elevation at the bottom of the shoe.

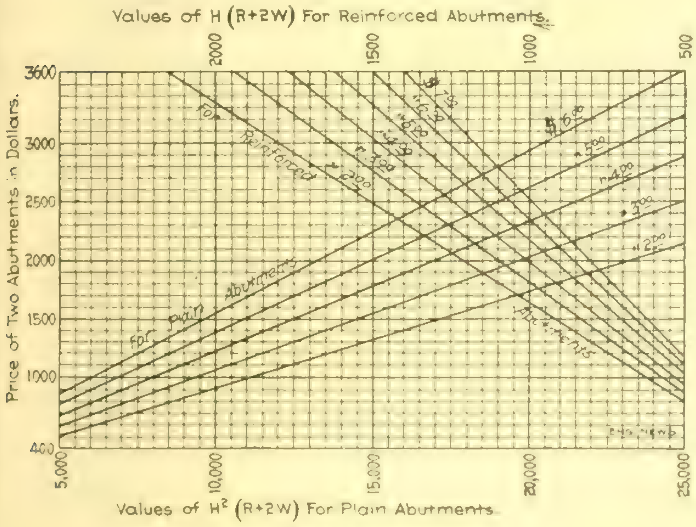

Fig. 2

It might at first be thought that the cubic contents would be more nearly proportional to the height only up to the bridge seat, because the height of the parapet wall is a constant for any given superstructure and is entirely independent of the height of the abutment. After plotting the quantities both ways it was found that the cubic contents varied more nearly proportional to the total height of the wall. The angle at which the wings stood with respect to the main wall ranged in these cases from 30 to 60 degrees. The more nearly the direction of the wing approaches a parallel with the line of the road the higher will be the wing at the end, and consequently the number of cubic yards will be somewhat increased. But as the corner formed by the intersection of the abutment proper and the wing is measured twice, these two factors practically compensate one another.

For reinforced abutments 15 designs were taken from the files of the Commission and the number of cubic yards in the two abutments of each design was plotted against H × (R + 2W), the notation being the same as before. It is to be noted that in reinforced abutments the cubic contents vary in proportion to the total height, instead of as the square of the total height (as with plain abutments). Take the same abutments: clear roadway, 16 ft.; height, 18 ft., and length of wings, 15 ft. We have 828 as the quantity to be read off from the top of Fig. 1. Getting the intersection with the line for reinforced abutments, we find that the two abutments would contain 120 cubic yards of concrete. Fig. 1 is thus a ready means of ascertaining very approximately the concrete in two abutments in terms of the height, roadway and height of wings when the design of the abutments is in accordance with the practice as previously described.

Having found the expression that is a measure of the number of cubic yards in a pair of abutments, the next step is to correlate it with a unit price that we may be enabled to arrive at the approximate estimate. For this purpose the diagram shown in Fig. 2 has been prepared.

The actual cost of one cubic yard of concrete complete in place as an integral part of a wall will depend upon a number of individual items. For nearly all ordinary highway bridge abutments only the following items have a very large influence in determining the actual cost per cubic yard; (1) the cost (at the bridge site) of sufficient aggregate to make 1 cubic yard of concrete; (2) the cost (at the site) of sufficient cement to make this cubic yard of concrete; (3) the cost per cubic yard of concrete to make the necessary excavation to start the concreting of the footings.

There are exceptional cases where the cost of this excavation (which includes also cribbing, sheet piling and pumping) will run as high as $3 or $4 per cubic yard of concrete. On the other hand in a very few cases this excavation item may fall as low as 75 cents (or even 50 cents) per cubic yard. But for probably 85 per cent. of all the cases encountered, the excavation item will not vary more than 30 per cent. from a fixed quantity.

The item for mixing and placing concrete might vary from $1.25 per cubic yard for crushed rock concrete, mixed by hand, to possibly as low as 30 or 40 cents per cubic yard for gravel concrete mixed by machinery. In spite of this possible wide variation we find that the cost for this item varies but little from a fixed amount. Likewise the item for forms is a more or less fixed quantity for plain abutments and another fixed quantity for the reinforced abutments.

It will be seen that the cost of the cement and the aggregate delivered to the bridge site are the two items that have the most to do with determining the price per cubic yard of concrete. For plain abutments the sum of these two items will very seldom fall below $2, and will just as seldom exceed $6. Under the most favorable conditions in location near to a railway station, the cost of the cement delivered to the bridge site would hardly fall below $1.50 for plain concrete 1:3:5. Even if satisfactory gravel is available at the bridge site it would cost probably at least 50 cents per cubic yard to haul it to the mixing plant. On the other hand the cost of the cement and the aggregate at the bridge site might even exceed $6.

In the light of this, Fig. 2 has been prepared to give the price of two plain abutments under conditions where the cost of the cement and the aggregate at the bridge site might vary from $2 (by $1 increments) to $6, and for reinforced abutments from $2 to $7. The items for forms, mixing and placing concrete, and excavation will be as nearly a constant for the reinforced abutments as they are for the plain abutments.

From the 15 different designs of reinforced abutments which were used in preparing Fig. 1 it was found that the amount of reinforcing steel bars per cubic yard of concrete averaged 70 lbs., and that the widest variation from this average was small. This item for reinforcing steel, as well as the bending and placing of same, has been duly considered in preparing Fig. 2. Also all other items that have a material influence on the cost of concrete in place. For this reinforced work the mixture is 1:2½:5, as against 1:3:5 for the plain concrete.

Assuming the aggregate and the cement at the bridge site for one yard of plain concrete to cost $4, and using the same abutments that were previously considered, we find that 14,900 at the bottom of Fig. 2 intersects the $4 line for plain abutments at a point showing the price of the two abutments to be $1,770. Similarly, 828 from the top of the figure intersects with the $4 line for reinforced abutments at a point showing the price of the two abutments to be $1,620. This is not actual cost of the abutments to the contractor, but rather the price of the abutments; it being the figure at which the township of county can expect to get the work done by contract. By correlating the expression that measures the number of cubic yards in a pair of plain abutments, it would be possible to work out a diagram that would show graphically by the intersection of lines the economical height for any particular set of conditions. But what is wanted more especially is to get the absolute figure on a pair of reinforced abutments, both under the same conditions.

It is not the practice to select the type of abutment merely upon the relative price. A case frequently arises late in the season when the abutments must be built before freezing weather. The reinforced abutments might be the more economical by say $100, but by the selection of this type the work might be delayed two or three weeks in getting the reinforcing steel from the mills. Again, the frequency of freshets might make the contractor's cost of pumping, cribbing, etc., excessive. As it might requıre two or three times as long to carry the concreting up to the water surface by using the reinforced type as against the plain wall, the latter should be the design adopted, providing the differences between the cost of the two types would not be excessive. It might be mentioned also, that no small part of the concrete work under the supervision of the Illinois Highway Commission is done by local men who have had very little experience with concrete. This point, however, is not considered in selecting the type of abutment, for the reason that the Commission furnishes a competent inspector to superintend the construction of the work. Thus, the complexity of the design is not an embarrassment to the local contractor.

Steam Rolling In Road Construction

Practical Hints on Most Efficient Methods—Stone Should be Well Rolled Before Binder is Applied—Directions as to Spreader

By W. Maughan*

No hard and fast rules can be laid down for this sort of work, but at the same time it is absolutely necessary that the driver should understand how to make a road, or, rather, he should know how not to unmake it—for the spreader of the material is the man on whose eye and judgment falls the brunt of the task of shaping the roadway. The chief point for the driver to observe, and in which his roller is specially concerned, is that he should so drive his roller that he first of all completes the work of the spreader in doing his share towards the actual shaping of the roadway, while he should also endeavor so to use his roller that any inequalities of surface left by the spreader are eliminated; and, generally speaking, these two men must understand each other thoroughly and "work to each other" if good work is to be effected. The roller should first be driven carefully along the outsides, working out a little at the ends before starting to go back, for if the driver goes along the outside of the roadway without getting away from the side before starting back he will find that the engine will drop a few inches nearer the side when reversed, so that on all ocasions it is best to get out a few inches, working the width of the hind rollers up towards the center of the road. Then do the other side the same way, always trying to keep the margins in towards the middle of the road; or, put another way, first form the abutment of your arched roadway, only putting on the crown as you would the keystone of an arch—namely, last of all.

A roller should not be run along too fast, 2 miles an hour, generally speaking, being quite fast enough; and in some cases this could be brought down to 1½ miles an hour with advantage. The driver should not go twice along the same track unless on the outsides. Of course, if the outsides are well consolidated there will not be much chance of the metal squeezing out and the crown getting flat, a point which is of vital importance on roads subjected to heavy and fast motor car traffic. Besides it is no use the spreader shaping the road if the roller is used in such a way as to partially undo his work. In fact, the great aim of the driver should be to complement the work of the spreader by what might be termed a "leveling up and down" process, care being taken to add any additional material required to fill any depressions as soon as they show themselves under the roller, instead of leaving these until the roller has made them worse, while also making the filling up more difficult by consolidating the material around the depressions.

I might here, perhaps, give one or two of the chief causes of these depressions, or incipient potholes, which are often the rule in coating work badly done, but which occasionally appear in even the best work.

All depressions or potholes, orat least all large ones, in the old surface, should be filled up and rolled before the regular coating is applied. As the result of my experience on heavily motor traffic roads, I might add that I have this done even before the foundation coat is applied, as I consider such preparatory work absolutely necessary if a finished surface is to be obtained.

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*Presented at the General Meeting of the Institution of Municipal Engineers of Great Britain.

No stone should be tipped, either from carts or barrows, within such distance from the edge of the metal as will preclude the possibility of that stone being applied without being completely "turned over." This is, of course, more necessary when the spreader is fed from carts than from barrows, as not only do the small stone, chips and dirt fall principally over a paratively small and probably softer material. At least but the larger stones, of course, roll down the outside, and thus practically form a ring of the larger sized and, generally speaking, sound metal around the comparativel ysmall and probably softer material. At least this is what generally happens when coating with material which has been broken by hand on the road side.

Directions as to Spreader.

The spreader should be a spreader in reality, not one who merely levels down the heaps of materials in the defective manner I have endeavored to describe, while also for the most part thus managing to get the smallest of the stone at the bottom and the largest at the top—the exact reverse of which procedure should be his chief aim. Further, when spreading particular care should be taken to work round the outside of each heap and get the largest sized material on that portion of the road where it is most required—e.g., when dealing with one of the narrow or "single track" roads I take particular care to see that the largest sized metal is carefully put in the wheel tracks, the smaller sized material being left for the crown, which will generally be found on such roads to be unduly high, in some cases in fact being squeezed up by the weight of the heavier vehicles passing over it.

To revert, however, more particularly to the duties of the driver, he should, of course, avoid, all hollow places and depressions (especially with the hind wheels of his roller) to keep down all places that appear high. These place are easily seen from the roller by an observant driver, and if the results of his obervation are pointed out in a good spirit, and the men all work together, first class work is the result.

All stone should be well rolled before any binding is applied, and here again it is experience that counts, the object to be aimed at being to consolidate the stone as thoroughly as possible without crushing, before any attempt is made to bind the coating. When this stage has been reached the driver should immediately stop rolling until the binding is applied, even if it means keeping the roller standing, as the "grinding down" of stone is the most costly method of producing binding that can be imagined, while at the same time resulting in that most deceptive finish so often seen where these "dust manufacturing" methods have been resorted to.

In any case the aim should be quality, not quantity; but if the latter term must be the objective, why, then, use fine soil in its virginity? If the road is very narrow and "round" or high in the middle the driver will find he has only to lap over a few inches instead of the whole width of the wheel, as in such cases only the insides will be touching the road, and so will leave ridges along the coating unless covered a little at a time.

The sweepers should try to get the stones "covered up" as soon as possible, as this gives the driver a much better chance of getting them down properly. Slag can be got down pretty tight before any binding is put on, but stone requires much more thorough "working in" of the binding material; where stones are applied in excessive thickness they will keep "on the work" unless the binding is judiciously worked in. I believe in getting the material down as tightly as possible before being watered, and in having any stones carefully put back into place that get moved from any cause whatever. Instead of excessively rolling any soft spots, try to avoid these as much as possible, and apply a little extra binding to keep the material down after you have got it in shape. If this soft place extends over only part of the road, it is much better to come over it backwards as much as possible, as the front wheels take out the track of the back ones, so by running forward on the side that is hard and coming back over the soft places it will be got into shape.

The "Mushroom" System

More and more the advantages of flat slab construction are becoming evident. From an attractive folder recently issued by the office of C. A. P. Turner, we quote the following points brought up in favor of this construction:

1. To build the floor slabs so as to transport the load directly to the columns without the use of beams and girders and take full advantage of the extraordinary strength developed by slabs reinforced in several directions.
2. To simplify the centering and thus reduce the cost of the temporary part of the construction.
3. To eliminate the beams and girders which interfere with light, catch dust, cost money to plaster and finish and reduce the clear storey height.
4. To arrange the reinforcement with a view to secure the maximum efficiency of the material.

Other points taken up in detail in the folder are the economic features, the adaptability, computation, etc. The folder is of interest and can be secured by addressing Mr. Turner at 816 Phoenix Building, Minneapolis, Minn.

Mr. L. P. Sherwood, principal assistant engineer of the Trent Canal, Peterborough, has been appointed principal assistant engineer in the Department of Railways and Canals, Ottawa.

Anchor ice has been a source of some trouble at the intake to the pumping plant of the waterworks of Cohoes, N.Y. The city's supply is taken from a power canal which taps the Mohawk River and the pumping is done entirely by waterwheels. The intake to the wheels is protected by a screen of steel bars with 1-in. clear openings between each pair. During cold weather anchor ice forms at the bars to such an extent as to block the passage of water through them and it is necessary each night to rake the bars clear and turn a steam jet on them.

Treating sawn and hewn ties in the same cylinder load was discussed by Mr. H. J. Whitmore during the recent annual meeting of the Wood Preservers' Association at Chicago. He advocated separate treatments, claiming that timber from which sawn ties are cut is, as a rule, of a better grade than that from which hewn ties are taken; that the hewn ties are usually seasoned along the line, while the sawn ties usually come direct from the mill and are, as a rule, green and not ready for treatment, anad that the treatment can be controlled more readily when the two classes are separated.

The Building of a Mammoth Storage Dam

Constructional Features of an Interesting Engineering Work in Maine—Dimensions of the Structure — Difficulties Encountered by Contractors

Innumerable difficulties have had to be overcome in the building of the Azischos dam on the Magalloway river in the State of Maine. Located at the headwaters of the Androscoggin river in the Rangeley Lake system, this dam will have a storage capacity of eight billion cubic feet of water. It was no until February 15, 1910, that a decision was made to build a dam and its type decided upon. As it was imperative that all possible work should be performed during the ensuing summer, there was not therefore sufficient time to get out plans from which contractors could bid intelligently and the company instructed the engineering firm of Sawyer & Moulton of Porland and Lewiston, Me., to start the work on the force account basis.

Rush Work Before Spring Freshets.

Realizing that it would be necessary to commence work before the spring freshets set in, work was started immediately and for the hauling of 44,000 bags of cement together with a cableway 1,200 feet long, vast quantities of steel, stone crushers, machinery and supplies of various kinds to the amount of 250 tons, required perfecting of one of the most efficient transportation systems ever evolved. There remained only six weeks during which teaming would be possible and to haul to the site of the dam, 40 miles from the nearest railroad station at Colebrook, N. H., the supplies and plant necessary for so gigantic an undertaking, was a task of herculean proportions. As it required at least four days for the teams to make the trip from the site of the dam to the freight station and return, and as there were not a sufficient number of farm dwellings located on the roads to be traversed, it became necessary to erect houses and stables at convenient points along the line of travel, so that the men and horses could be properly cared for during their journeys. So well laid out were the plans for this that the teams travelled on schedule time, and up to this writing it is stated that the instances have been rare when they feiled to keep up to their schedule.

The Dam as it Will Appear When Completed

Owing to the great expense of getting material into the site it was decided to build a cellular concrete type of dam, and during the past summer 40 teams have been at work and ten loads of material have been delivered at the dam daily.

The construction of the dam consists of piers four feet thick and 20 feet on centres, with a face slab resting against their upstream sides all to be reinforced. This is not the first dam of this type ever designed, but it is thought to be the first one ever constructed, and its general dimensions are as follows: Total length, including core wall 881 feet; height from ledge to top of dam 78 feet; depth of water held by dam 60 feet.

One of the first difficulties to be met with by the engineers was the lack of good sand bank within many miles of the dam, and it was necessary to make sand from the glacial debris on the ground. It was found that one-half of this material was sand suitable for the concrete, but the problem was to find a way to separate the good from the bad, and this was accomplished by designing a plant which screened the material, mixed it with water and then separated the different sized grains in a tank of flowing water. This was done by taking advantage of the fact that heavy particles settled more quickly than lighter ones. The sand grains which could be used were carried away to a storage bin, while the dirt and fine particles were carried away by the current of water. This apparatus worked so successfully that enough sand was made during the summer to provide for all the concrete that has been made up to this time. Only a few hundred feet from the dam a quarry was opened to obtain crushed rock for the concrete and by means of a gravity tramway the broken stone was conveyed to the crusher, the crushed rock being delivered to the elevators which hoisted it to the stop of the store bins under which were located the concrete mixers, and as soon as the concrete was mixed, it was picked up by the cableway and carried in a narrow gauge road that runs over the top of the dam and rushed to its final resting place in the forms.

Water Used in Excavating.

It was necessary that a very large amount of earth be handled as cheaply as possible and for this reason it was decided to install a pumping plant of large capacity. Two "Terry" steam turbines were installed, each directly connected to an Alberger centrifugal pump. These turbines were supplied by a battery of six boilers, and the pump supplied 2,000 gallons of water per minute under a pressure at the end of the line of 100 pounds per square inch. The great force of this water was employed to excavate trenches and carry the mixture of water and dirt through flumes and to deposit the earth at any desired point. The preparatory work of clearing the site, building roads, cutting timber for fuel and saw logs, and the erection of temporary buildings was commenced on September 1, 1909.

Test pits had shown the depth below the surface of the ground at which ledge would be found, but they had not shown the condition of the ledge. When finally uncovered the ledge was found to be seamed where it was absolutely sound; this meant the removal of a layer over a large part of the dam foundation from 8 feet to 16 feet in thickness. The removal of such a large amount of ledge held back the progress of the work about six weeks. It also necessitated the working of large crews of men in restricted areas and otherwise complicated the details of construction. One of the most important questions in the construction of a dam of this height is the design of forms. The fact that the dam is composed of a large number of divisions practically alike suggested the use of forms made in sections so they could be taken down and used over. A system of bracing was originated doing away with the ordinary shoring that runs to the ground, comprising bolt sockets imbedded in the concrete, and pockets left in the faces of the piers to receive the bracing of the forms above. It is not believed that this way of building forms is any cheaper than the ordinary method, but it is strongly advocated on account of the rapidity with which they can be assembled without employing an army of carpenters to keep the form work ahead of the concrete.

One of the Two Outlet Tubes to be Embedded in Dam

Just above the site selected for the new dam stands the old Azicohos logging dam. A flume was constructed to carry the flow of the river from the old dam over the foundations of the new dam. When the outlet provided in the new dam was finished the water was turned through it and the old flume thrown away.

A Sluiceway in the Dam.

The entire country for many miles above the dam is heavily wooded and it is probable that for many years to come there will be 2,000,000 feet of logs passed through the dam annually. This introduced one of the hardest problems to be solved in the design of the dam. A study of conditions showed that it might be necessary to sluice logs through the dam with the lake level varying 25 feet. A slot was cut in the dam and a steel truss carrying a V-shaped flume was suspended at its upper end in this slot. The lower end of this truss was carried on trucks on a concrete pier below the dam. The logs are guided from the lake into the log-way slot in the dam where the rush of water running from the inclined flume carries them along. This flume is to be continued down the river two miles where the logs will be discharged into the river. This steel truss is suspended at its upper end from a frame so that it can be raised or lowered by a hand power crane to meet the level of the water in the lake.

Present Status of the Work.

At the present time, the concrete foundation is in place along the entire length of the dam, and the buttresses and face wall are at varying heights. The work has been pushed energetically during the winter so that when the melting snows in the spring of 1911 fill the valley of the Magalloway river a large amount of water will be held. Proper provision is made during the cold weather for warming the materials from which concrete is made so that it sets before it freezes. Steam pipes and canvas covers are provided wherever necessary. A considerable amount o. concrete has been placed since the freezing weather first appeared in the Magalloway regions, but as yet no concrete has been frozen.

The progress of the work is all that could be desired and since the beginning of concreting over 100 yards have been placed daily.

Vancouver Water Supply

The civic authorities have presented an application for water rights on Seymour Creek covering the establishment of a storage system on the stream which will enable the installation of supply mains capable of fully meeting the demands of the population of Great Vancouver in the years to come. The city will secure a flow of 100 cubic feet a second, equivalent to 50,000,000 gallons a day.

The waterworks officials believe that the creation of storage reservoirs at the points can be accomplished at comparatively small expense and provide during the heavy spring flow down the stream an ample supply of water for the enlarged city during the dry months of the summer.

The application does not in any way affect the present records on the Seymour, which total 3,000 inches, and are considered to fully cover the average flow of the stream. The rights sought are solely for storage purposes which stand on a different footing for an ordinary application for a water record. The dams erected to form the various storage pools will be equipped with gates which will enable the average flow of the creek to continue, merely retaining the surplus during the time of high water.

Cement Grout Cushion in Street Railway Pavement Construction

The contributing causes of trouble in construction along street car tracks appear to be: Vibration caused by the movement of cars over the tracks. Leakage of water into the cushion between the rails and adjoining pavement. The heavy stress to which the pavement is subjected, owing to the concentrated traffic upon it. A study of these conditions as they affect the pavement along street railway tracks has been made by Mr. Harry G. Davis, C.E., of Chicago, on behalf of the Chicago Street Improvement Association, and from his recently issued report we have taken the matter in this article.

The policy of street car company officials of increasing the weight of their cars and moving them at a greater speed means that present construction on a carline street must be stronger than in the past. Every tendency of one part of the pavement to separate from the adjoining part is augmented, and every possible effort must be made to prevent this. For instance, in a creosoted block, brick or granite pavement, which is laid on a sand cushion, special treatment is needed to prevent this sand from being jarred out of place, causing a corresponding sinking of the pavement over the spot where the sand has "shifted."

Another evil effect of vibration upon the pavement, is that it has a tendency to cause disintegration. The disintegrating effects of vibration on a creosote block, brick or granite street is probably confined to the concrete foundation and to the cushion which is laid between the foundation and the pavement surface. Experience has proved that a well-made Portland cement concrete, properly mixed and tamped, is not affected by vibration to any serious degree.

Still another disastrous effect of vibration is to open a joint between the car rail and the abutting pavement, permitting water and mud to seep down into the cushion between the foundation and the pavement surface, permeating and diluting it to such a degree as to cause it to "shift" easily. This shifting process leaves a void beneath the paving surface and as soon as that part of the surface is subjected to the stress of traffic it sinks. This sinking, although it be only a matter of a fraction of an inch. is disastrous to any pavement and especially to a creosoted block, which, probably more than any other form of pavement, demand the maintenance of a smooth, even surface. As soon as the block goes down the least bit, it begins to get the pounding effects of the heavily loaded vehicles and a "rut" is produced.

With the sand cushion, usually laid underneath a creosoted block, brick or granite pavement surface, filled with water to saturation, the sand in reality becomes a quicksand, and extremely mobile. And it would appear that the "ruts" frequently seen along the car tracks on a comparatively recently paved street are the results of leakage of water from the surface of the pavement through the interstice between the pavement and the rail, opened, no doubt, by vibration, into the sand cushion and converting it into quicksand which, through its mobility, shifts beneath another part of the pavement, or out through the interstice upon the surface of the pavement. The vibration also has a "pumping" effect upon the saturated sand and augments the leakage to the surface of the pavement or the shifting to another position beneath the surface.

The leakage of water into the sand cushion may have another deteriorating effect upon the pavement aside from that of converting the sand into a quicksand. If the sand is thoroughly saturated and then frozen, it is likely to heave to such an extent as to subject the pavement adjoining the rails to undue stress. This might result in serious damage to the pavement.

It is doubtful if there can be any disastrous results from the stress of traffic upon the pavement adjoining the street car rails if the evils caused by vibration and leakage are overcome and the pavement set at the proper grade in reference to the grade of the car tracks. Unless there is a "drop" of the wheels of vehicles from the car rails to the pavement, or a "climb" from the rails to the pavement, there should be no trouble whatever. It might be well, at this point, to emphasize the importance of as nearly perfect joint as possible between the rails and the pavement.

It appears then that the chief difficulty comes from the leakage of water into the sand cushion, augmented by vibration and the stress of traffic upon the pavement, causing a shifting of the sand in the cushion. This would indicate that the remedy lies solely in a treatment of the cushion which would render it impervious to water and thus remove the liability of "shifting" or leakage to the surface of the pavement, causing a shifting of the sand in the cushions. This would indicate that the remedy lies solely in a treatment of the cushion which would render it impervious to water and thus remove the liability of "shifting" or leakage to the surface of the pavement.

Several years ago, the South Park Commission in the city of Chicago adopted the policy of paving all intersections of parkways and carline streets with creosoted blocks. Not being bound by the specifications of the city of Chicago, the Park Commission laid its blocks on a cement grout cushion. Some of these intersections have been paved for nearly five years and altogether there are about 25 or 30 of them. In every case they have proved a success. Although some of the intersections have been subjected to extremely heavy traffic the pavement adjoining the street car tracks is in as good condition as it was the day it was laid. There can be little doubt that the success of these intersections is due to the fact that the grout cushion, being impervious to water, does not "shift" or leak out upon the surface of the pavement, and therefore remains in place and supports the blocks. No other explanation has been suggested.

Cement Grout Construction the Remedy.

The remedy, then, for the troubles surrounding street car track construction—and this applies with equal force to creosoted block, brick or granite pavements—is to provide for a cement grout cushion both between the street car tracks and for a distance of at least 1 foot outside of the outside rails. This will make the cushion impervious to water and will prevent its shifting from vibration or under the stress of traffic.

One of the features of this form of construction is that it adds but little to the cost of the pavement, and is easily made. The grout should be what is known as "dry-mix" and should be prepared in this way: Mix three parts of sand with one part of Portland cement, all dry, and work well together before placing in position. After being thoroughly mixed, spread the cushion in the same manner that a sand cushion is spread. Lay the blocks on this cushion and tamp them to place. Then flush the blocks thoroughly, so that the water may enter through such interstices as exist and into the cushion. If possible, keep traffic off the blocks for 24 or 48 hours to give the grout time to set, although this is not absolutely necessary, as the cement will "cake" sufficiently to make it a great improvement over a sand cushion, even though traffic goes on the blocks almost immediately.

Another difficulty that has been experienced with creosoted blocks on car line streets is the development of transverse "ruts" between the tracks. These "ruts" apparently result from the tie rods which are set at regular intervals, tying the rails together. Where this form of track construction is adopted, the blocks should be chamfered so as to provide for the tie rod. This would add but little to the cost of the pavement, probably not more than a cent or two per yard, as only two courses of blocks in every 6 lineal feet would need to be thus specially prepared.

C.N.A.B. Holds Great Meeting in Winnipeg

Report of the Fifth Annual Convention—Discussions and Business Prove the Vital Importance of this Association—Next Session at Toronto

Though the fifth annual convention of the Canadion National Association of Builders has passed into history, its work will remain. An outstanding feature of the convention has been the fact that now, after years of labor, the members are beginning to see their way clear to the attainment of the objects for which the association was primarily organized. But further, avenues have opened up whereby its scope of usefulness may be enlarged, and doubtless within a brief time it will become one of the leading factors in the development of Canada.

The national character of the association was never more in evidence than during the sessions held in Winnipeg, February 15 and 16. The members registered numbered over 100. Many of those from Winnipeg did not sign the register, though they attended and took part in the discussions. There were delegates from Quebec, Montreal, Ottawa, Toronto, London, Regina, Calgary, Edmonton and Lethbridge, and from the present rate of progress the number of constituent exchanges will have increased by fifty per cent. before the date of the next convention arrives.

Among those who registered are the following:

List of Members.

Robert Grant, Edmonton; E. T. Broad, Lethbridge; H. J. Toole, Lethbridge; A. M. Frith, Edmonton; D. J. McKay, Regina; Wm. Wilson, Regina; John A. H. Kake, Calgary; R. A. Brocklebank, Calgary; A. Desilets, Edmonton; J. W. Aldridge, Calgary; G. W. Boughton, Edmonton; W. T. Brown, Edmonton; R. L. McIntyre; John Jones, London; Thos. B. Beir, London; L. H. Martyn, London; E. R. Dennis, London; A. E. Hobbs, London; G. S. Gould, London; Geo. Gander, Toronto; Ed. Gearing, Toronto; John Robertson, Toronto; James Robertson, Toronto; A. D. Wetmore, Edmonton; C. C. Batson, Edmonton; P. L. Fraser, Toronto; H. V. Mitchell, Winnipeg; John McQuarrie, Winnipeg; C. R. Frost, Edmonton; J. H. Lauer, Montreal; George Pheasy, Edmonton; John Aldridge, Toronto; F. H. Davidson, Winnipeg; Frank Powell, Winnipeg; E. T. Nesbitt, Quebec; Henry Jennings, Toronto; C. M. Bremner, Edmonton; W. G. David, Regina; G. W. Bitnell, Toronto; E. A. Cunningham, Lethbridge; D. D. Smith, Regina; A. Smith, Lethbridge; R. J. Orr, Toronto; J. H. Tremblay, Winnipeg; A. J. Slocum, Regina; A. E. Davies, Regina; Shepley Construction Company, Winnipeg; J. Morley, Winnipeg; J. Lackie, Ottawa; Aug. Brochmer, Ottawa; James More, Ottawa; W. H. Carter, Winnipeg; F. E. Halls, Winnipeg; A. H. Aldinger, Winnipeg; George E. Bell, Winnipeg; W. E. Ramsay, Montreal; F. W. Forster, Calgary; F. J. Huxtable, Winnipeg; Thos. Barnard, Regina; A. M. Fraser, Regina; T. C. Allardyce, Winnipeg; Chas. Bulley, Toronto; D. A. Crothers, Winnipeg; J. T. Watson, Winnipeg; Jos. Bourgeault, Winnipeg; C. H. Taylor, Winnipeg; D. L. Campbell, Ottawa; Oliver & Manson, Winnipeg; W. P. Alsip, Winnipeg; G. S. Schaester, Calgary; W. J. Leslie, Toronto; C. H. Webster, Calgary; George Halford, Winnipeg; S. J. Kilpatrick, Winnipeg; Henry Bourgeault, Winnipeg; George Kennedy & Son, Winnipeg; W. J. Hynes, Toronto; E. Claydon, Winnipeg; Fonseca Roofing Company, Winnipeg; W. J. Davidson, Winnipeg; A. C. Osborne, Winnipeg; J. Threlfall, Winnipeg; George Murray, Winnipeg; R. Fullerton, Winnipeg; John Wallace, Winnipeg; M. W. Julien, Winnipeg; R. T. Beals, Edmonton; P. L. Harvey, Edmonton; C. S. Shipman, Winnipeg; S. H. Foster, Winnipeg; George Garrow, Winnipeg; F. Bateman, Winnipeg; M. Haas, Winnipeg; R. L. McIntyre, Toronto; Chas. Orr, Toronto.

Important action was decided upon in many details of the work, not the least of which was the decision to bring to bear upon the federal and provincial authorities, influence which may make for the passing or introduction of legislation which will assist in the objective of the association. The labor issue came up on several occasions and a resolution asking that the scope of the Lemieux Act be extended to the building trades received the heartiest support.

Changes to the constitution were made which will encourage the development of exchanges in the smaller towns and cities of Canada, and during the year every effort will be made to induce the formation of exchanges at every point of importance. Provincial associations will also be encouraged, as being best adapted to meet strictly local conditions and influences.

Mr. E. T. Nesbitt, of Quebec, who was re-elected President of the C.N.A.B.

At the opening meeting held on Wednesday morning, February 15, Mr. J. W. Morley bade the delegates welcome in the name of the local exchange. He said that he felt that the convention would prove to be a notable one because of the effect it would have in binding together the exchanges of the whole of Canada. So strong an organization could not fail to have an influence for good, and at the same time it would encourage the building up of a number of exchanges that would be attracted to the parent organization. The association had already proved itself, and the time had come for it to adopt an aggressive policy. The members would benefit personally and he was sure that Canada as a whole would be beneficially influenced. Harmony and co-operation should be the watchword.

The address of the president received a most hearty welcome. Copies were distributed among the delegates. That they appreciated the ideas advanced was sufficiently evidenced in the action taken later. The address was as follows:

President Nesbitt's Address*

At this our fifth annual convention I have the honor of addressing a truly representative association of all Canada. It has been my privilege as president during the past year to have contributed to the realization of our aims and aspirations, i.e., tomake the association a power in the land, and I may be pardoned if I express myself as being proud of my achievement, for I am greeted here in this hall by representatives of every city of importance from Quebec in the far east, to Edmonton in the west, and I have the personal satisfaction that it is partly by my efforts that this has been accomplished. It is indeed a gratification to me to know that they have been appreciated. I take this opportunity to thank all the exchanges for the royal reception given our secretary and myself on the occasion of our recent visit to them.

When I joined the national body two years ago, it was composed of only three exchanges. To-day we are twelve, with a membership of about 1,200. I cannot but tell you how much we owe to our indefatigable secretary, Mr. J. H. Lauer, for his part in the missionary work, and any success must be shared with him.

Our Purpose and Objects.

It will, I hope, not be found out of place to make you acquainted with the purpose and objects of our organization. The importance and need of organization is demonstrated by the fact that the volume of the building business in Canada last year totalled $120,000,000. These figures are convincing arguments for the necessity of perfecting our association. And now that we are here together it behooves us to get to work and accomplish something for our cause.

I will here enumerate a few of the important subjects that we must take up and discuss.

Legislation.

This is a big question, for we have to meet the labor element with their perfect organization, their councils, their members and their power, both at the seat of the federal government and at the provincial legislatures. They not only have members of parliament to advance their interests, but a Minister of the Crown to watch that their demands are considered, while we, their employers, have to stand and look on—helpless. We should take a lesson from them, and instead of objecting to their methods we should emulate them.

Employers' Liability.

Laws are being enacted in every province that must be watched and fought so that no arbitrary measures are passed without our having a say.

Apprenticeship.

I need not here tell you of our great handicap of having to carry out work with unskilled workmen, and that in face of the restriction placed upon us by the labor unions, and with the aid of the government discouraging the immigration of tradesmen and mechanics, and to cap all, making it unlawful to work more than eight hours per day. This is a vital question to our business and I would suggest that the state be asked to add to their policy of technical education a system of trade schools that will teach a boy to handle tools in such a way that the teachings of these higher educational establishments may be made capable of being carried out. For what will be the use of producing men able to develop beautiful designs if we cannot get men skilled enough in their trades able to execute them

Lemieux Act.

Steps should be taken by us to persuade the government to have this act apply to all industrial disputes, instead of, as now, only to the labor disputes in public utilities. This would tend to lighten our burdens and avoid many strikes.

Architects.

Our relations with the architects is a subject of great moment to us, I would urge that measures be taken to have plans and specifications of all works for which bids are invited deposited in our exchange rooms. This would be a great benefit both to the architects and builders. Several other questions, such as detail plans of proposed work to accompany the general plans, should be discussed. I might add, in this connection, that the Public Works Department of the Federal Government has courteously acquiesced in our request and we are now receiving plans in the different exchanges.

Lien Law.

This, to my mind, is one of the most important measures that must be taken up. At present it is unsatisfactory and should be referred, if necessary, to a competent lawyer to frame a law that will protect the builder from loss.

Uniform Contracts.

A study of this should be made by competent men and a draft sent to all the exchanges for study and approval.

Incorporation.

I would recommend the consideration of the question of having ourselves incorporated by Act of Parliament. This would give us a status, add dignity to our association and give us better recognition.

The foregoing address, which was received with much enthusiasm, was referred to the committee on resolutions for the consideration of the suggestions offered by Mr. Nesbitt.

Mr. J. H. Lauer on the Work of the Association.

The Secretary-Treasurer, Mr. J. H. Lauer, of Montreal, submitted a brief summary of the work undertaken during the past year in the interests of Canadian builders.

He stated that at the last convention in London a resolution had been adopted, requesting the Federal and Provincial Ministers to furnish plans and specifications of projected public works to the respective builders' exchanges existing in the vicinity of the work contemplated. Copies of this resolution had been forwarded to the proper quarters, and he was happy to report that the request had been received with the greatest courtesy both by the Provincial and Federal Departments of Public Works, and finally conceded by Hon. Wm. Pugsley, Federal Minister of Public Works. It would be in order at the present convention to adopt resolutions of appreciation for the courtesies extended.

From a legislative standpoint, the most important measure brought forward at Ottawa was the perennial flower of Mr. Verville's 8-hour day bill on all federal public works. A resolution opposing this measure had been adopted at the last convention, and duly forwarded to Ottawa, asking that a hearing be granted to the representatives of the builders. The president and himself had made two trips to Ottawa in March and April last, and had appeared as witnesses before the special committee of the House, to which the bill was referred. The fundamental objection to the bill was that any arbitrary limitation of work in the building trades was opposed to the natural climatic conister of Labor, urging the extension of its scope to the building trades. This Act had proved conclusively that compulsory investigation by a disinterested tribunal into the causes of trade disputes had averted projected strikes in nine cases out of ten; and strikes after all were "industrial civil war," benefiting neither employer nor employed. He recommended the adoption of an urgent rsolution requesting the Department of Labor to extend the scope of the Act.

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*Synopsis

The present policy of the Interior Department in discouraging the immigration of skilled mechanics also called for amendment. This country was suffering from scarcity of skilled labor, and it was absurd to attempt to artificially limit the supply of Canada's rapidly growing requirements to what might have been sufficient five or ten years ago. Every skilled mechanic in this country was an asset, and there was no danger of lowering the wage standard for years to come.

He welcomed the western exchanges into the national body, as a result of the president's tour last year, and had been in correspondence with St. Thomas, St. Ste. Marie, Stratford, Hamilton, and the eastern section in Halifax and St. John, anad sincerely hoped by next year they would be one united body from coast to coast.

ditions of Canada, whereby outdoor work was already seriously cramped and limited by our rigorous winters. Other objections were the discrimination against one particular trade in whcih a nine or ten-hour day in summer did not constitute any physical strain or hardship, while other trades which did constitute such strain and which employed young people of tender age, were not interfered with; and finally the injustice inflicted on the workman himself, who would thereby be precluded from making provision in fine weather against the short winter days. Canada was not yet industrially competent to adopt an 8-hour day against other competing nations. No convincing reply had ever been submitted against these arguments, and the bill went over last session only to be re-introduced during the present one, in a much more limited form. When the bill reached committee stage last January, he had sent telegrams to the respective Ministers again opposing the measure, which was also meeting with opposition from the labor unions themselves. It seemed certain, however, that in its present modified form the bill would be adopted, and deemed further steps to be wasted.

Another measure of interest to builders was the "Industrial Disputes Act, 1907," in connection with which he had had both interviews and correspondence with the Min-

During the first session the following committees were struck: Committee on legislation—Messrs. Sylvester, Calgary; J. W. Morley, Winnipeg; Aldridge, Toronto; Ramsay, Montreal, and Martyn, London, Ont. Committee on resolutions—Messrs. Nesbitt, Quebec; Aldridge, Calgary; W. H. Carter, Winnipeg; Broughton, Edmonton; E. R. Dennis, London; H. G. Goode, Lethbridge, D. J. McKay, and George Gander, Toronto, and J. H. Lauer, Montreal.

At noon the city of Winnipeg expressed its appreciation of the action of the Association in holding its convention there, by tendering the visitors a formal luncheon, at which his Worship, Mayor Evans, and the city council were the hosts. The luncheon, which was held in the Royal Alexandra Hotel, passed off most successfully. Mayor Evans especially congratulated the local exchange for the work it had accomplished in the upbuilding of the city, the grand total of which had set a record for Canadian progress in building operations. The only complaint he had to make was that the builders were making such progress that the city was more than kept busy in supplying the new districts with the necessary local improvements. The strongest proof of the beneficial nature of the C. N. A. B. lay in the fact that all over Canada there were exchanges being organized which sought affiliation with the parent body. The Mayor also touched upon civic planning and the work of the builder in preventing fire waste by encouraging a higher standard of construction. President Nesbitt made a suitable reply.

Because of a wet snow storm the afternoon entertainment did not materialize, but in the evening a hastily planned smoker gave an opportunity for the members from the different provinces to get together.

Thursday's session opened sharp on time, the whole of the morning being devoted to the papers of Mr. Morley and Mr. MacKissock. The latter was published in our last issue.

Some of the expected papers did not appear for the afternoon meeting, Mr. Isaac Campbell sending his regrets, and Messrs. Irish and Cass being out of the city. However, those on hand afforded considerable matter for discussion. A tilt occurred between Mr. Deacon and Mr. Turner as to the respective merits of steel and concrete for building purposes.

Steel in Building Work.

In a general introduction to his address, Mr. Deacon gave a brief outline of his subject, pointing to the advantages of steel in building operations, its great strength and compactness, together with its ability to stand up under shocks which would mean the destruction of buildings of any other material. It was steel which made the high buildings of the present day possible, for in the past a high building meant an excessively thick foundation and bottom courses. With steel, all that is required are curtain walls, each floor carrying its own wall material. Even in buildings of from but four to six stories, steel effected a great saving.

Then there was another advantage, more particularly noticeable in Canada. The steel could be fabricated during the winter months when ordinary building operations were impossible, making it possible to complete a building during a single season. Then, too, it had always been found difficult to deliver materials during the height of the season, so that advance orders assured delivery. In his opinion, which he confessed might be biased, steel frame constructions with tile and thin concrete floors was the most advantageous type. So far as relative cost of concrete and steel was concerned that was a debatable question. Steel, however, could be erected more rapidly, and in case it was ever necessary to remove the building, there was always a certain amount of salvage in the steel structure.

As to its ability to carry weight, steel had fully proved itself, while with wood and concrete there was always a measure of uncertainty. There seemed to be no limit to the height to which steel buildings might be carried. Valuable property must have high buildings and it would seem that within twenty-five years many of the structures being erected to-day would have to be replaced by something more modern.

Mr. Deacon then went on to speak of what has to be done on structural steel after the contract has been let and before the piece can be shipped:

"As soon as a contract has been secured and entered, complete data relating to the construction is turned over to the drafting department. The first thing to be done by this department is to prepare a list of the material required, which is called an advice bill. The draftman to whom this is entrusted first carefully examines all data. If any necessary information is found lacking at any point in the progress of the work it is at once reported. Care is taken to include everything in the order bill that will be required to make the building, unless upon enquiry it is found that certain materials may be ordered later.

"In order to expedite the placing of orders for the material at the mills no more drafting is done than is necessary. It may be supplemented by freehand sketches and notes, which are preserved with other data for reference, by the checker and draftman making the shop drawings. For a contract of any magnitude the order bills are gotten out in sections; those parts which would be needed first are prepared first. In any case the first attention would be the supply of material which would be most difficult to get promptly. The order bills are checked and a copy sent to the order department. The originals are retained for the guidance of the draftsman who makes the shop drawings.

"The order department makes up a mill order from the order bills, bringing together all items of the same kind and combining some of the shorter lengths into longer lengths to be sheared at the shop to proper lengths.

"Most companies must keep more or less material in stock, in order to be able to make prompt delivery of certain classes of work. In this way considerable waste of short pieces accumulates, which is applied on contracts whenever an opportunity offers or sold for scrap.

"After these mill orders have been made out the work is assigned by the chief draftsman, who has general supervision of all work, to whatever man he thinks is best fitted to get out the drawings. Generally a contract is given to a squad foreman, who has three or four men working under him, and who directs the method of getting out the work, writes the order bills for the material, and sometimes makes some of the more complicated drawings. When the drawings are made and traced they are sent to a checker who is generally an experienced draftsman. He checks every size and dimension given on the drawing and marks every change necessary in blue pencil. The drawing is then checked back and corrected by the one who made it and after being accepted and signed by the checker is ready to be sent to the blue print room. The man who makes the drawing and the checker are held equally responsible for any errors.

"When the shop drawings on a contract are complete, blue prints of them and the accompanying bills of material are sent to the various departments of the shop. In the template shop a wooden template is made for each constituent piece of each different member. This template is of the exact length or half length of the finished piece, giving bevels and has holes at every point where a rivet hole is to be located. It is to be clamped to the metal for the purpose of laying out the work to be done on each piece. Laying out directly upon the metal is seldom done because of the danger of making errors and ruining the steel for the purpose for which it is intended. When the steel arrives from the mills it is unloaded at one end of the plant, and marked with the contract number and sizes for future identification. Pieces of the same size are piled together and separated from other sizes as far as possible, so that any material can be gotten out easily at any time without handling other material which is not wanted. The unloading is usually done with an overhead travelling crane which deposits the material in any part of the yard. When enough material in any contract has been received from the mill and that contract is reached on the shop programme, the material is run into the shop as needed and usually continues straight through to the opposite end of the plant, where it is completed.

"The first operation after the material enters the shop is to straighten it out so that the template may be applied and all pieces laid out accurately. This is done with presses, rolls and sledges. The next operation is the laying out, or marking the lines on which the material is to be sheared and with a centre punch which fits closely the holes in the template, the rivet holes are marked. Some material is sheared to length and then laid out. From the shears or laying out skids the material passes to the punches where all rivet holes are punched. Next the various pieces which are to be riveted together are assembled and fitted, sufficient number of bolts being inserted to hold the material together until it is rivetted. Before the pieces are assembled such faces as will be inaccessible after rivetting are painted, and before the rivetting is done the holes are reamed out to correct inaccuracies in punching. After all the operations are performed on a piece it is run into a scale and weighed, a shipping bill being made out. Having been weighed and inspected to see that it conforms to the drawing, it is painted and loaded upon cars or stored to go out when required. All bending, forge work, upsetting, etc., are usually done in the blacksmith shop. Turning, planing (except rotary planing) is done in the machine shop. All pieces before shipping are marked very plainly for identification, and a good erection diagram showing all marks and the position of all pieces in the contract is made."

Mr. Deacon closed with a few remarks about western conditions and practice.

The committee on resolutions had prepared its work most thoroughly anad the following resolutions were brought forward for consideration and adopted:

Resolutions and Business.

Moved by George Gaudet, (Toronto), seconded by G. Silveste (Calgary):

Resolved that a cordial vote of thanks be tendered His Worship Mayor Sanford Evans, and the council of the city of Winnipeg for the very generous hospitality extended the members of the 5th annual convention of the C. N. A. B. held in Winnipeg, February 15th, 1911. (Carried).

Moved by George Gander (Toronto), seconded by John Aldridge (Toronto):

Resolved that the thanks of the C. N. A. B. in executive session assembled at the 5th annual convention in Winnipeg, February 15th, 1911, are hereby tendered the Hon. the Minister of Public Works of Canada, for his courtesy in acceding to the requests of this body, expressed in the London convention to furnish plans and specifications of federal public works to the secretary at the local exchanges comprised in this association, to be constructed in the district in which such cities may be considered the centre. (Carried).

Moved by George Boughton, Edmonton; seconded by L. H. Martyn, London:

Resolved that the secretary advise the Minister of the Department of Public Works of all additions to our federated exchanges, from time to time, as such may occur. Further, that in accordance with the correspondence submitted from the deputy minister in April, 1910, the department be respectfully requested to include a copy of all public works to be executed in the vicinity of the principal building exchanges throughout Canada. (Carried).

Moved by W. E. Ramsay, Montreal; seconded by G. Silvester, Calgary:

Resolved that this convention again respectfully urge action, as already submitted by the London convention of 1910, by the Hon. the Minister of Labor, to include the building trades within the scope of the Industrial Disputes Act of 1907, and that this action be taken during the present session of parliament. (Carried).

In presenting this resolution Mr. Ramsay explained that in view of the success which had attended the operation of the Lemieux Act, it was thought advisable that it should also be applied to the building trades. It had saved a great deal of loss wherever it had been applied, and its operation had now been so far demonstrated as to win the commendation of many other countries

T. R. Deacon feared that the period of investigation preceding the making of the award might lead to the men shirking, but the convention did not think that this would be material. This difficulty would adjust itself.

Moved by E. R. Dennis, London; seconded by W. H. Carter, Winnipeg:

Resolved that this society obtain the necessary information in regard to incorporation; and should this information prove favorable, that the executive be empowered to take the necessary steps after each local constituent exchange has been fully consulted with. (Carried).

Mr. Nesbitt pointed out that if it were found advisable to incorporate or register the association, it would put them upon a firmer basis in law. It would make them a corporate body capable of signing contracts and making agreements within the law. Then, too, they would be able to insist, more strongly, that the labor unions become incorporated bodies. Nothing would be done, however, without first considering all exchanges.

Moved by L. H. Martyn, London; seconded by H. J. Goode, Lethbridge:

Resolved that article 7 of the constitution be struck out and the following substituted—"Applications for membership in the C. N. A. B. by local building exchanges shall be accompanied by cheque equal to the sum of $1.00 per member of the actual total membership comprising such local building exchange at the time of the application for admission, as entrance fee, but in no case to exceed the sum of $50.00. (Carried).

Moved by Mr. Aldridge, Calgary; seconded by G. W. Boughton, Edmonton:

Resolved that whereas, as the result of the conferences between the delegates representing the three Alberta exchanges, a provincial association has been formed to be known as the Alberta Association of Builders' Exchanges, working under and in connection with the National Association, this convention places on record its approval of the said action, and moreover, favors the extension of the principles of forming provincial associations in other provinces under the jurisdiction of the C. N. A. B. wherever the officers of the constituent exchanges of any one province deem it desirable to so co-operate for dealing with provincial legislation or other purely provincial problems.

Resolved further, that article 4 of the constitution be amended by the insertion of the following words after the first sentence—"In such cases where provincial associations are organized under the jurisdiction of the C. N. A. B., each such provincial association shall elect its representative vice-president on the executive committee of the C. N. A. B., the result of such election to be reported to the general secretary. Nothing herein contained, however, shall deprive the local exchanges comprised in such provincial associations, of their direct representation to the national association executive and convention. (Carried).

Moved by John Aldridge, Toronto; seconded by E. R. Dennis, London:

Resolved that the whole national association advocates the general principle of "open shop." It recognizes that under certain local conditions the enforcing of the "open shop" may not be practicable, and therefore declines to interfere with the authority of any constituent exchange to deal with its labor problems as it deems advisable. (Carried).

It was felt that the strong feature of this resolution lay in its recognition of the principle of individual action, while favoring the principle of the open shop.

Moved by W. E. Ramsay, Montreal; seconded by Mr. Aldridge, Calgary:

Resolved that article 8 of the constitution be amended by the addition of the following clause—"Provided always that any member of any constituent exchange when securing contracts within the territory of any other affiliated exchange shall conform to all rules and by-laws governing the exchange in whose district they secure the said contract." (Carried).

Moved by John Aldridge, Toronto; seconded by G. W. Boughton, Edmonton:

Resolved that each exchange be instructed to study without delay the existing lien laws of each province with a view to effecting amendments for the better protection of contractors and supply firms. (Carried).

The president recommended the Quebec Lien Act to the members present as being the most favorable now in force in Canada.

Moved by H. J. Goode, Lethbridge; seconded by L. H. Martyn, London:

Resolved that this convention, recognizing the desirability of the uniformity of contracts, and also the fact that architects are grouped into provincial associations with varying practice in different provinces, urge the preparation and acceptance (by means of joint conferences between the various provincial architects and affiliated builders' exchanges) of a "uniform contract," in accordance with the requirements of each province which shall become the recognized contract acceptable to and enforced by members of constituent exchanges. (Carried).

Moved by W. E. Ramsay, Montreal; seconded by Mr. Aldridge, Calgary:

Resolved that this convention go on record as favoring the principle of the "Daylight Saving Bill," from the conviction that our workmen are justly entitled to some hours of leisure and recreation during the summer months, which can be effected without loss to either side by commencing work from May 1 to September1, at 6 a.m., and closing down Saturday at noon.

After a brief discussion this measure was defeated by the western vote. It appeared from the nature of the discussion that the delegates did not appreciate the resolution, nor understand how the desired end was to be attained.

After some discussion it was decided that a deputation from the association should wait upon the Ottawa government to urge the interests of the Canadian quarry proprietors and cut stone contractors, it being generally considered that the present tariff does not afford sufficient protection to the industry.

Resolutions of thanks were also accorded the retiring officers, members of the local exchange, the press and all others who had assisted in making the convention a success.

The election of officers passed without a hitch except that Mr. Nesbitt attempted to ecsape from the unanimous vote that he retain the chair for at least another year. The members were insistent that he should continue the work which he had begun so ably and he bowed to their wishes. The result of the election was published in our last issue.

On February 14th some thirty or more delegates from London and Toronto, en route for Winnipeg, paid a visit to St. Paul, Minn., where they were entertained by the officers and members of the Builders' Exchange of that city. Mr. J. A. Seager, the president, and Mr. C. V. Williams, the secretary of the exchange, did the honors at a most enjoyable luncheon. Afterwards the party was joined by a number of Montreal and Quebec delegates, and a visit was paid to the magnificent State House and other places of interest.

The annual banquet, held in Manitoba Hall and attended by 642 persons, was one of the most noteworthy of the kind ever held in Winnipeg and is likely to mark a high-water level for the association for a number of years. There was keen competition for the next annual meeting, there being almost a tie between Calgary and Toronto. The deciding vote, which rested with Winnipeg, was given to the Queen City, and the easterners will thus have another chance to show the west that they can rise to the occasion. The 1912 convention promises great things and preparations are already being discussed.

Personal News and Notes

Mr. Neil R. Darrach, the St. Thomas, Ont., architect, will leave shortly for the West, having decided to transfer the scene of his activities to Regina, Sask.

Messrs. Spencer and Campbell have been placed in charge of the Montreal office of Kilmer, Pullen & Burnham, which has been opened at 11 St. Sacrament street, Montreal.

The Calgary bricklayers and masons have notified contractors that their wages will be 70c. an hour on and after June 1st, 1911.

Mr. H. S. Hancock, jr., formerly city engineer of Fort William, Ont., has opened an office at Vancouver, B.C., as consulting engineer.

Mr. John Lockhart died at Salisbury, N.B., last week. He was known as an expert bridge framer, having supervised much of this kind of work in the province during the last forty years.

City Engineer Rust, of Toronto, estimates the cost of the installation of water meters at between $700,000 and $800,000. It is thought that metering would result in a greatly decreased consumption and obviate the necessity for future extensions for a few years.

The death occurred recently at Meaford, Ont., of Mr. David McCann, a well-known builder and contractor. The late Mr. McCann was a native of Belfast and was in his 78th year. He saw military service with the Grey 31st Battalion at the time of the Fenian Raid.

Mr. Burtin Stewart, managing director of North, Griffirs & Company, general contractors, Vancouver, B.C., left that city recently for England, where he will remain for a few weeks. It is understood that Mr. Stewart's company is thinking of opening a branch office in Winnipeg.

Mr. C. H. Topp, formerly city engineer of Victoria, B.C., has been chosen to make surveys at the north end of Sooke Lake, preliminary to the employment of an expert supervising engineer for the construction work in connection with the big waterworks undertaking.

Mr. C. H. Mitchell, of Toronto, recently gave a lecture before the Engineers' Club of Cleveland, Ohio. Mr. Mitchell had a large audience of American engineers who were interested in the description of the works being completed by Canadian engineers.

Bruce & Sweatman, Limited, engineers and contractors, and Frank Sweatman, British Columbia land surveyor, have removed from Dominion Trust Building to Suite 16, Tunstall Block, corner of Granville and Dunsmuir streets, Vancouver.

At the 31st annual meeting of the Association of Manitoba Land Surveyors, held recently in Winnipeg, the following officers were elected for 1911: President, G. A. Bayne; vice-president, John Francis; secretary-treasurer, C. C. Chataway; members of council, J. L. Doupe, G. B. McColl, R. C. McPhillips and W. B. Young.

The Toronto Building Trades Council has called a mass meeting of workers, unionists and non-unionists, connected with all branches of the building trades, at the Labor Temple, for Wednesday, March 1, at 8 p.m. Addresses will be given by Mr. Allan Studholme, M.P.P., Mr. Wm. Glockling, president of the Dominion Trades Congress, Mr. John Bruce, general organizer of the Plumbers' Association, and others.

Mr. F. L. Fellowes has been appointed to the new post of supervising engineer of Vancouver, B.C., at a salary of $8,000 a year. The agreement is for five years, with a month's vacation yearly, and is terminable on six months' notice. Mr. Fellowes will take up his duties about the first of May. He went from Toronto to Westmount about thirteen years ago, and has been city engineer of Westmount for the last ten years.

The Concrete Form & Engine Company, Detroit, Mich., have favored us with an attractive catalogue containing a well-illustrated description of their various lines. Their collapsible steel forms are a great labor saver and are strongly recommended by prominent contracting concerns that have used them. The reduced cost of construction resulting from their use should appeal to contractors, city engineers, waterworks superintendents, state commissioners, and others who are buyers of supplies, materials and equipment for new work.

At the recent meeting of the Canada Cement Company Sir Sandford Fleming resigned as honorary president, being replaced on the board by Mr. Dennis Murphy, of Ottawa. Mr. C. H. Cahan, one of the largest shareholders, also resigned to admit of the election of a representative from London, Mr. Pierce Lacy. Mr. W. D. Matthews, of Toronto, also resigned, being unable to attend the board meetings. Mr. W. H. E. Bravender succeeded Mr. Matthews. The position of honorary president has been abolished. Senator Edwards and Mr. J. M. Kilbourne were re-elected president and vice-president, respectively.

At the annual meeting of the Ottawa Builders' Exchange on the 26th ult., Mr. T. D. MacFarlane was elected president; Mr. W. G. Adamson first vice-president, and Mr. A. G. Marshall second vice-president. Messrs. James Ritchie and D. J. Mackenzie were re-elected respectively as treasurer and secretary. The report for the year was most satisfactory. There are 115 members in the Exchange, representing 85 firms. The retiring president, Mr. Geo. A. Crain, who held office for three successive terms, spoke briefly on the activities of the past year. The delegates from this Exchange to the C. N. A. B. convention in Winnipeg on February 15 and 16 are Messrs. W. G. Adamson, A. G. Marshall, Jas. Lackie and August Boehmer.

Province of Quebec Electrical Association

At the annual meeting of the Electrical Association of the Province of Quebec the officers were elected as follows: President, N. Simoneau; 1st vice-president, C. Thomson; 2nd vice-president, L. Rousseau; treasurer, W. B. Shaw; secretary, J. E. McDougal.

Executive committee—F. J. Parsons, J. A. Hicks, C. E. McGregor, H. J. Vickerson, R. Moncel, H. Crouch, J. A. Valois and W. Smith.

York County's Road Work

At a meeting of the York County Council last week the Good Roads Committee presented its report, in which the following roads are recommended for improvement: Yonge street, from northern city limits to the town line between Markham and Whitchurch, 13 miles; Kingston Road, to Highland Creek; Weston Gravel Road, from Weston to Kleinburg station, 18 miles; Malton Road, from Weston to Malton, 6½ miles; Dundas street, from the city limits to Summerville, 5½ miles; Lake Shore Road, from Sunnyside to Long Branch, 5½ miles; Markham Road, from Langstaff to the town line between Pickering and Markham, 12½ miles; Don Mills Road, from city limits to Fourth Concession, Scarboro Township, 7½ miles; Kennedy Road, from northeast city limits to Stouffville, 23 miles; Vaughan Plank Road, from St. Clair avenue to Maple, 14 miles; making a total of about 120 miles.

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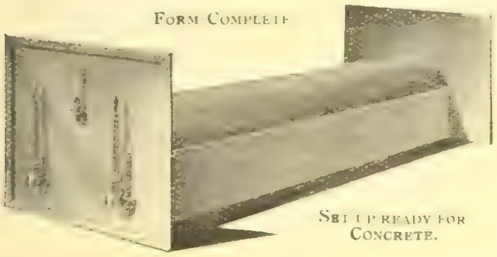

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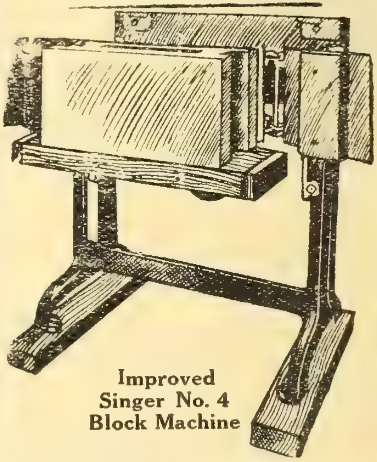

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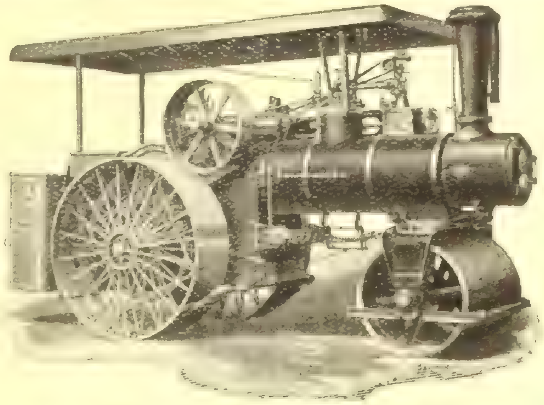

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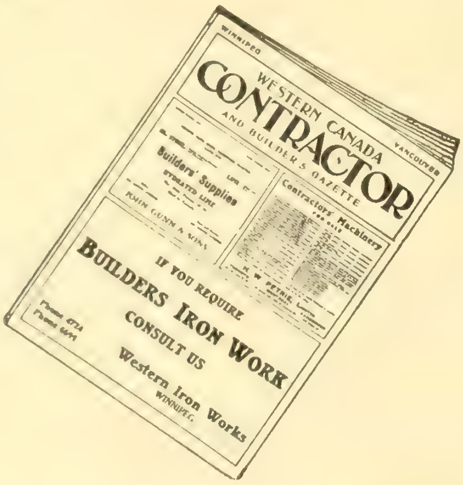

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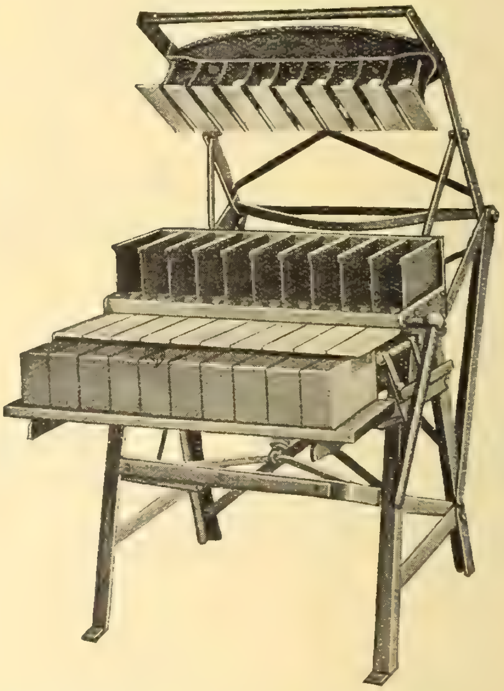

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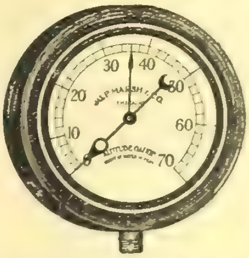

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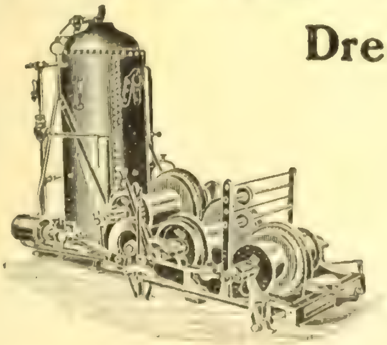

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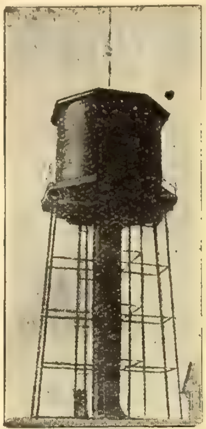

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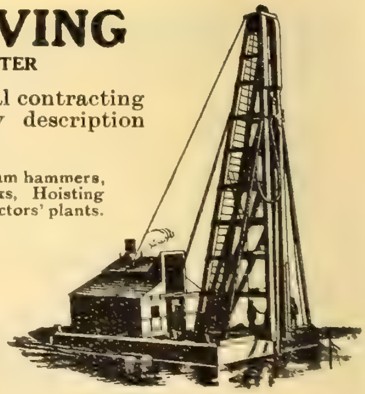

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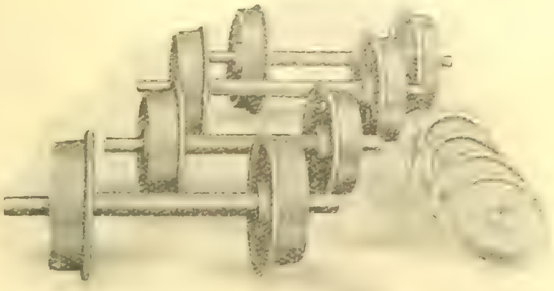

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The following are wholesale prices delivered at Toronto:—

	Per B.
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
White cut bricks for foundation work....	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches......	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES.

(Installed in Toronto.)

Floor Tile—Ceramic any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—½ inch square, 65 cents.

Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite 55 cents per square foot.

Vitreous Tile—All sizes, according to color, 55 to 65 cents.

Glazed—White, 6 x 3 inches, 55 cents per square foot.

Matt—Dull finish colors, first, 70 cents.

Capping Coves and Corners, special quotations to suit requirements.

Opalite Tile—3-16 inch No. 1 standard, size 6 x 3 inches, 6 x 2 inches, 60 cents.

White glass, installed, 6 x 3 inches, 30 cents.

STEAM FITTERS' AND PLUMBERS' SUPPLIES.

Standard compression werk, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 70 per cent.; roundway, 65 per cent.

No. 4 compression bath cock ....net	$1.65
No. 4½ Fuller's ....net	2.25

Square head brass cocks, 65; iron, 65 per cent

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range.

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks.

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb traps and bends, 50 per cent

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings.

Medium and extra heavy pipe and fittings, up to 6-inch, 70 and 10 per cent.

7 and 8-inch pipe, 50 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale lots of 1,000 barrels f.o.b. Toronto, bags extra, $1.65.

Cement, car lots, f.o.b. Toronto, bags extra, $1.70

Crushed stone, $1.25 per ton, f.o.b. Toronto.

Binder stone, $1 25 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $14 to $15 per toise.

Free stone delivered, 14 to $15 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Brown sills and beads, in the rough, delivered, 35 cents per foot.

Rubble stone in car lots, $1.25 to $1.30 per ton

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Steel channels and beams, $2.60 per 100 pounds, delivered f.o.b. Toronto.

Expanded Metal, No. 10 gauge, 3½ cents per square foot.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $2.20.

Manilla Rope, best, per pound, 15 cents.

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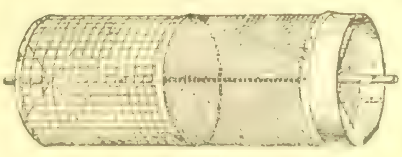

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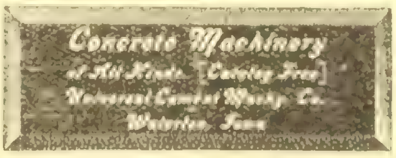

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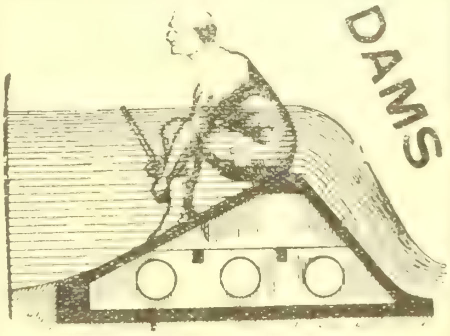

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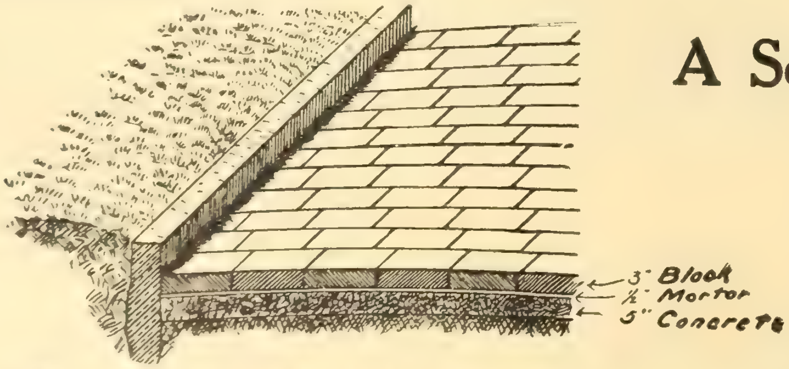

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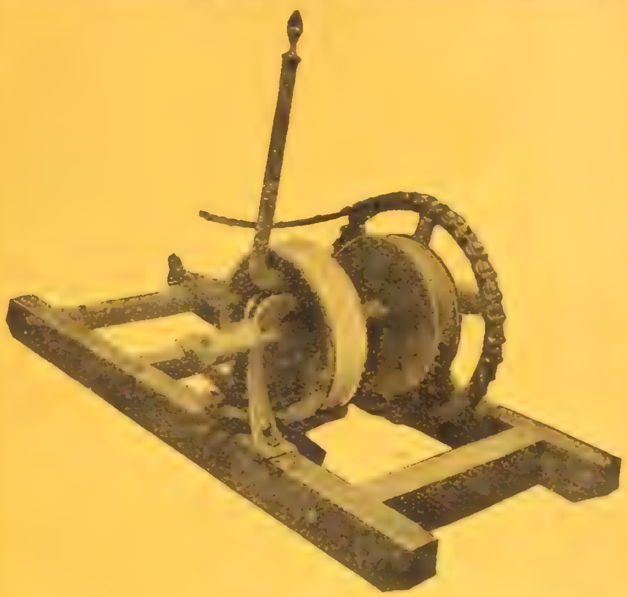

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This hoist can be used with any make or style of gas, gasoline or oil engine

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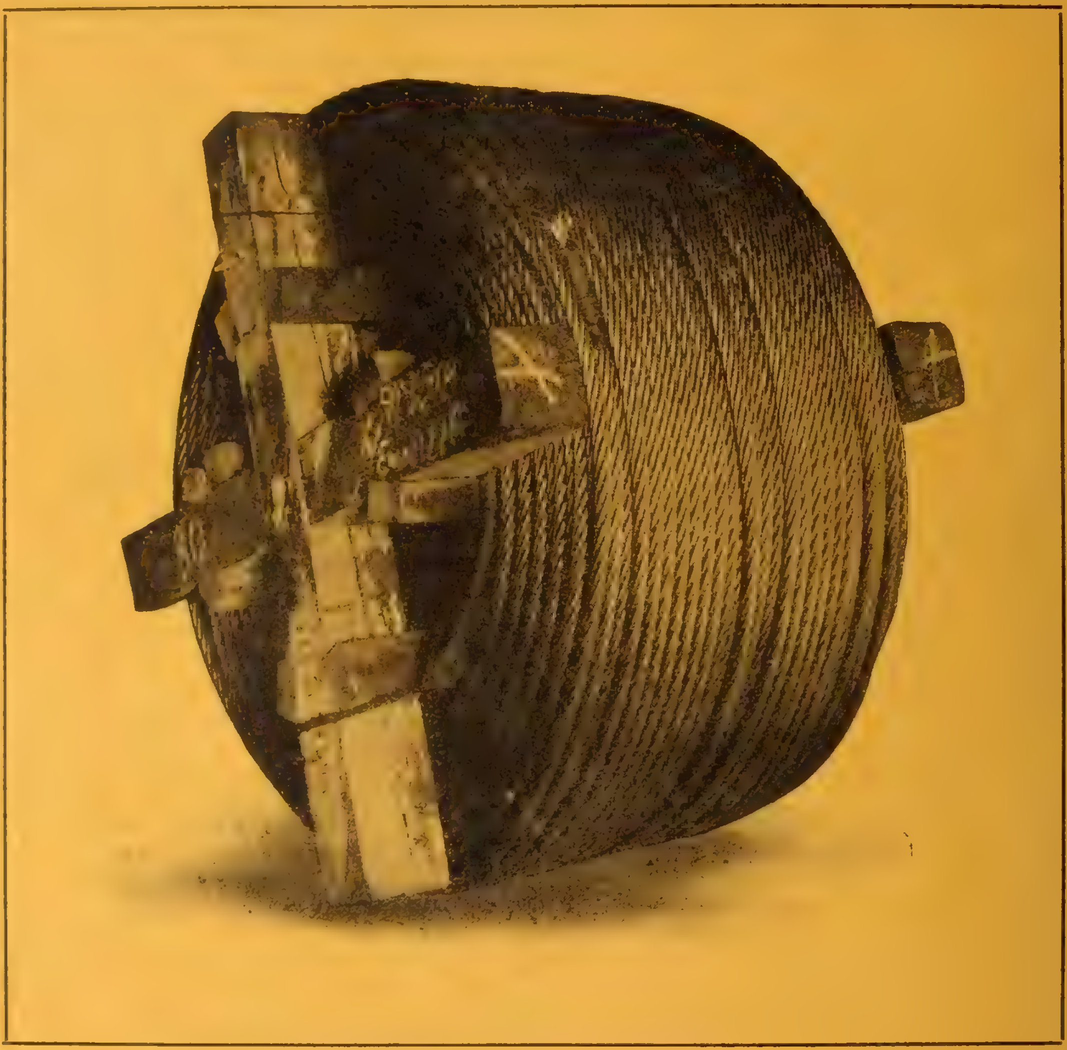

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that out of the mass of enquiries that come to us, there are a number that include questions as to what might be termed Allied Industries. These we now answer to the best of our ability, but we could answer them still more satisfactorily, if manufacturers of materials used in conjunction with cement would co-operate to the extent of sending copies of their catalogues and other literature to be placed on file in our office for reference.

We should like to obtain

the names and addresses, together with catalogues, and any other obtainable information of manufacturers of and dealers in:

1. **Concrete Machinery**
2. **Building Blocks**
3. **Cement Bricks**
4. **Tile Molds**
5. **Fence Posts**
6. **Re-inforcing Material**
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It is not alone for our own convenience that we make this suggestion; firms who manufacture or deal in such articles will find it to their own advantage to have this information in the hands of our Information Department, thereby enabling us to hand on to them from time to time enquiries for such materials as they severally make.

In sending catalogues, literature or information, please address same to "Sales Department."

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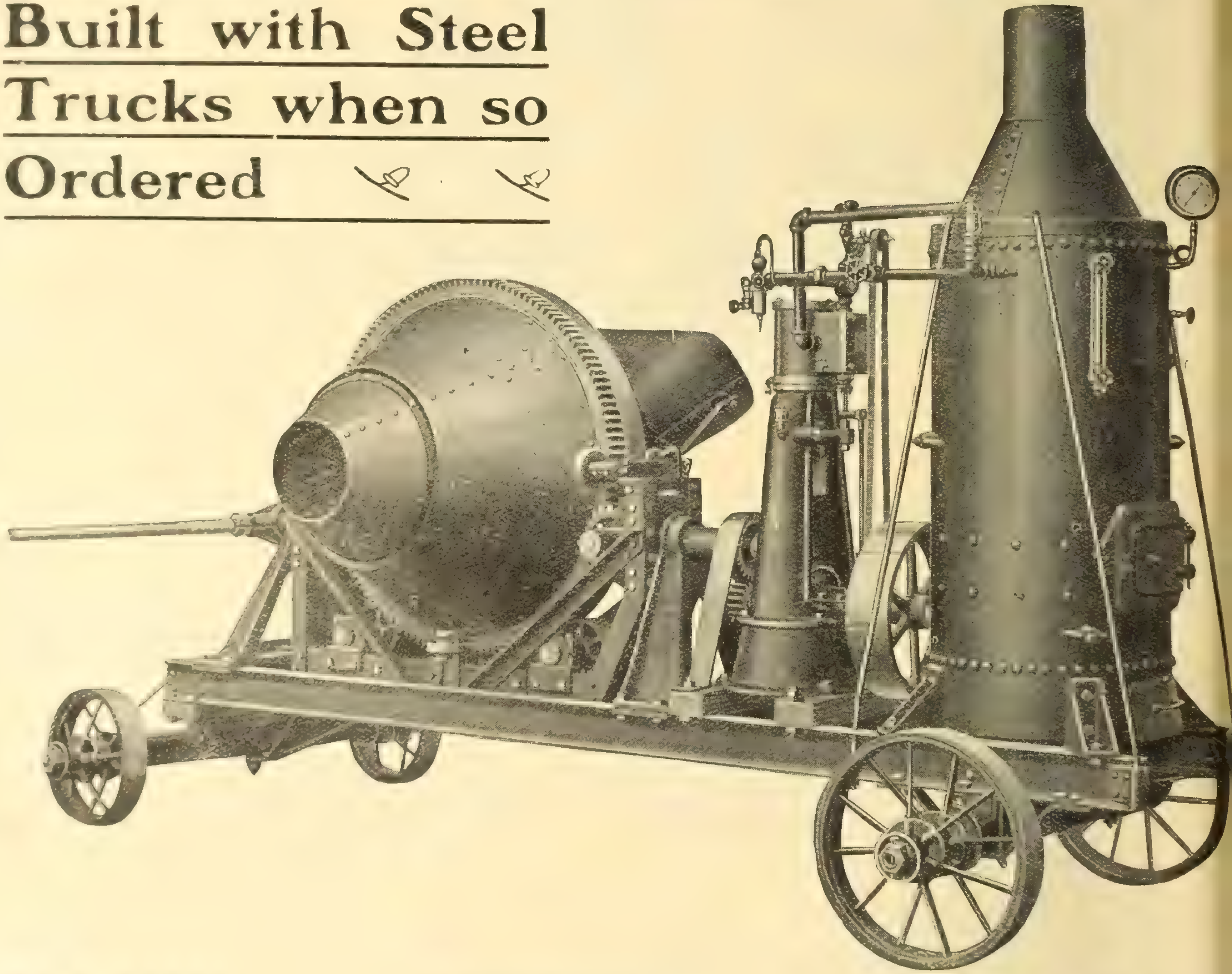
Built with Steel Trucks when so Ordered



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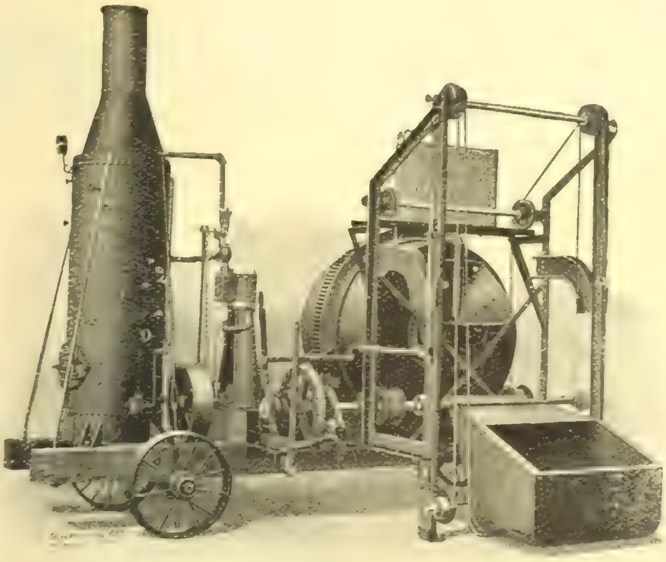

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Steam, Electric or Gasoline Drive.

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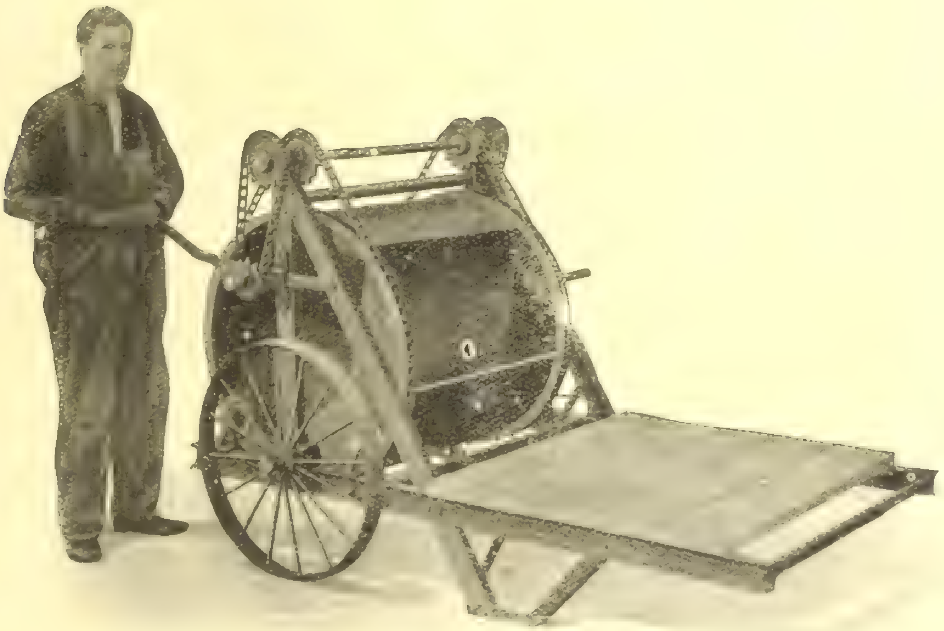

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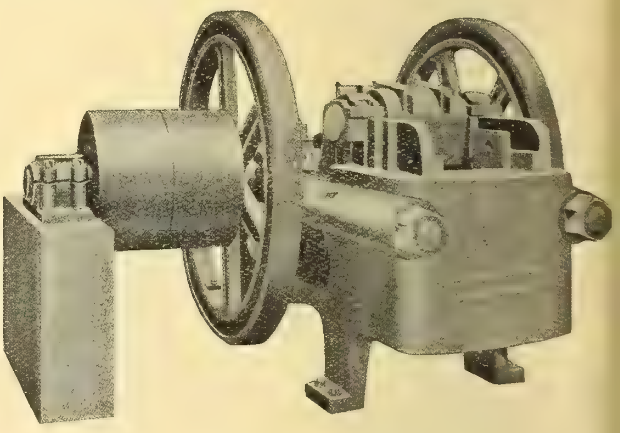

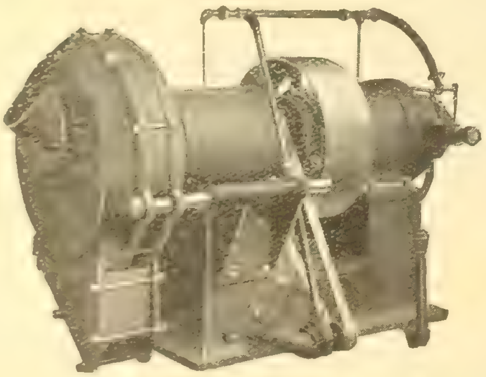

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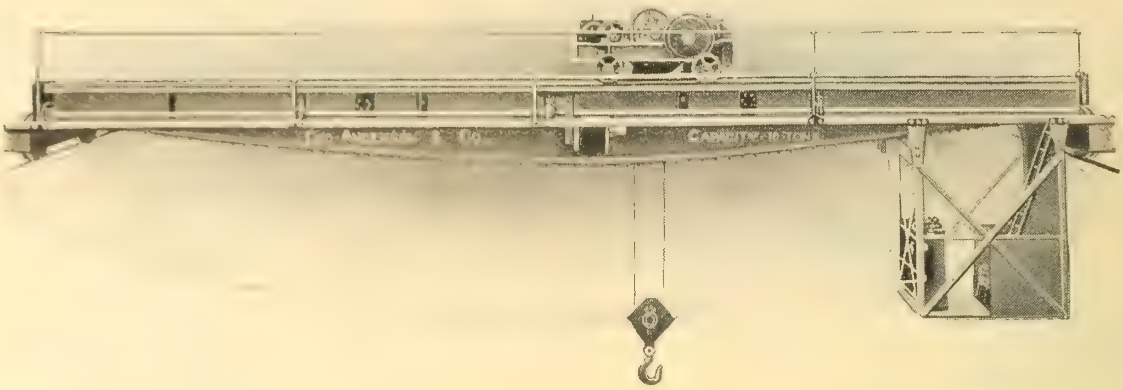

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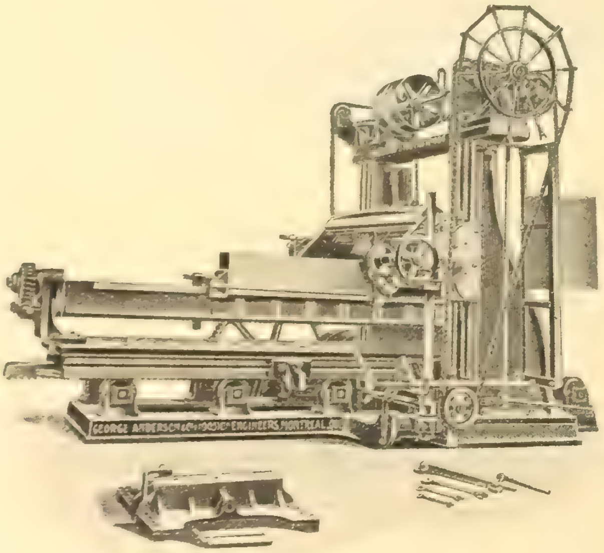

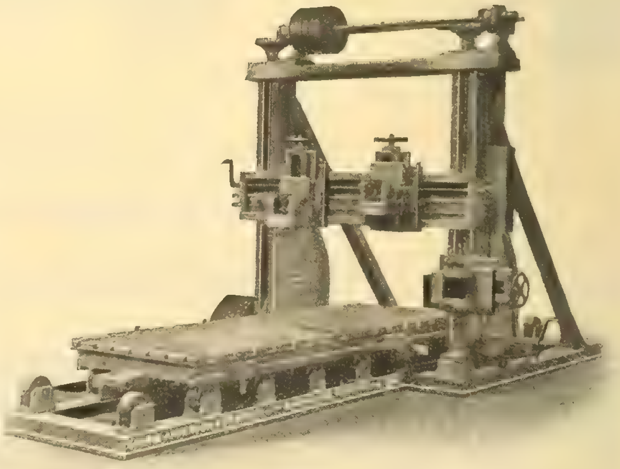

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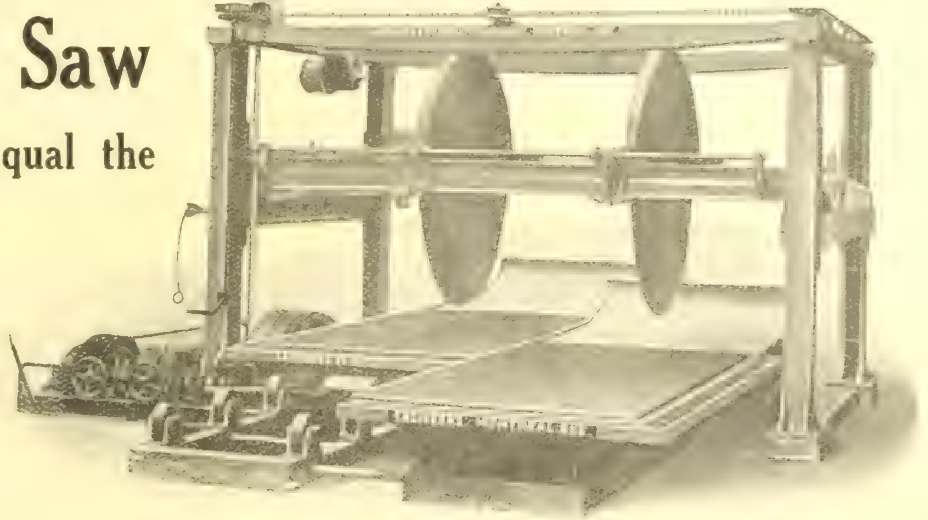

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Circular Diamond Saws

With Our Circular Saws We Revolutionized the Stone Trade

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12-0 x 12-0 x 3-0	12-0 x 7-0 x 3-0	12-0 x 8-0 x 1-6	12-0 x 6-0 x 1-2
12-0 x 12-0 x 3-6	12-0 x 7-0 x 3-6		
Rise and Fall Spindle or Fixed Spindle One or Two Blades		Rise and Fall Spindles One to Four Blades	

This is our LATEST addition designed to take care of all your small work

Sturdy True Reliable

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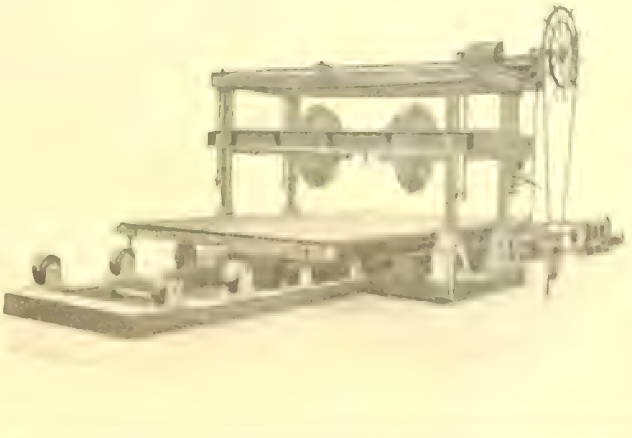

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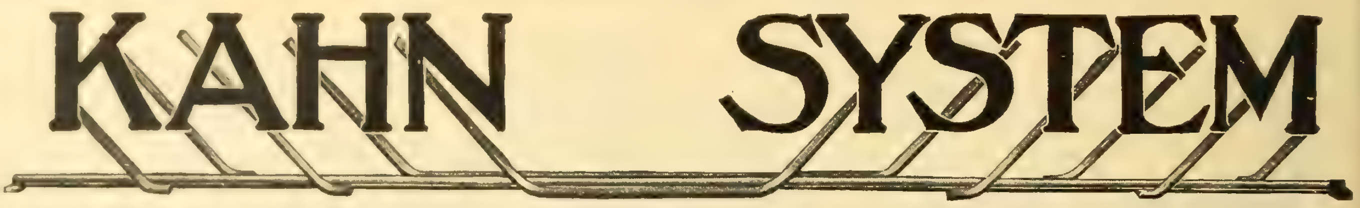

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Forget every admitted advantage of the Kahn Trussed Bar—consider it strictly from a dollars-and-cents standpoint, and you will find that its use actually saves you money. IN SIMPLE PLAIN ENGLISH WE HAVE THE CHEAPEST BAR ON THE MARKET AND WE ARE READY TO PROVE IT.

Kahn Trussed Bars save steel, because the shear members are formed from the flanges of the main bar which are ordinarily wasted, and thus do away entirely with the expense of loose stirrups.

Kahn Trussed Bars save labor of installing many loose bars, because the shear members and main bar are handled as one piece.

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Kahn Trussed Bars make beams 20 per cent. stronger than where loose stirrups are used, as proven by University Tests.

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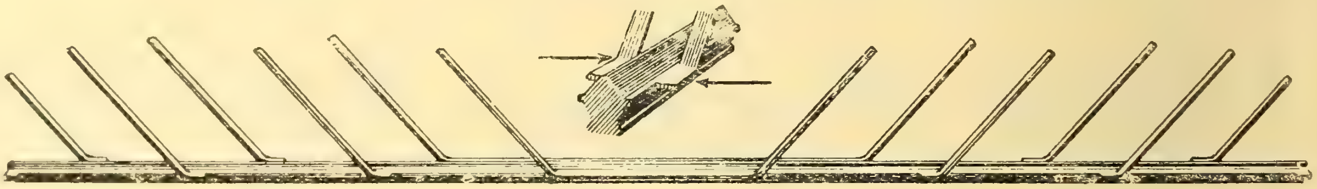

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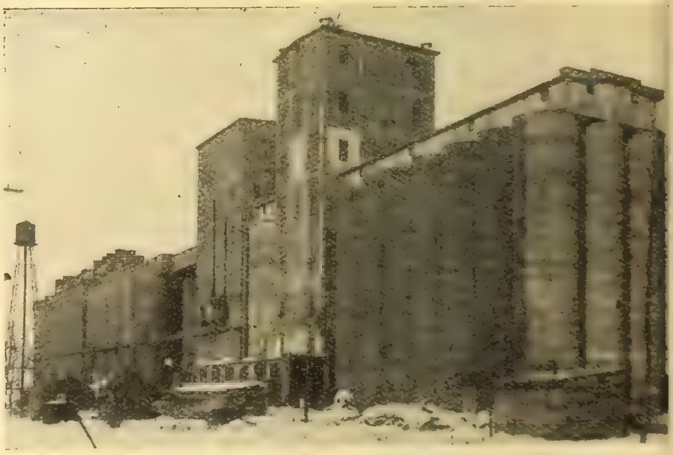
O. E. Tench, Newmarket, Architect
Bowman & Connor, Toronto, Consulting Engineers



Mill and Storage Bins for Western Canada Flour Mills
Geo. H. Archibald & Co., Engineers and Contractors.

KAHN SYSTEM
Reinforced Concrete

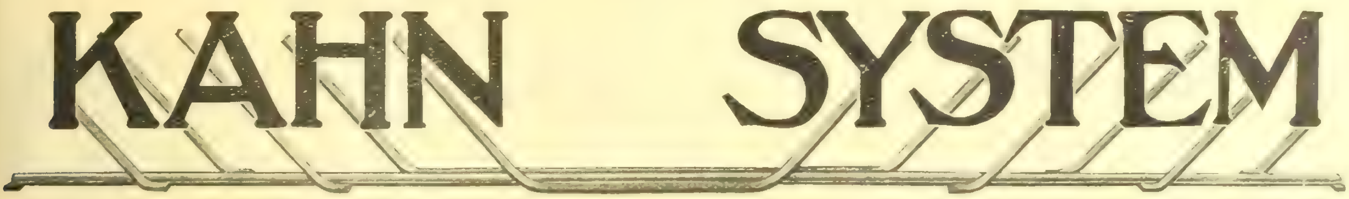
TRUSSED CONCRETE STEEL

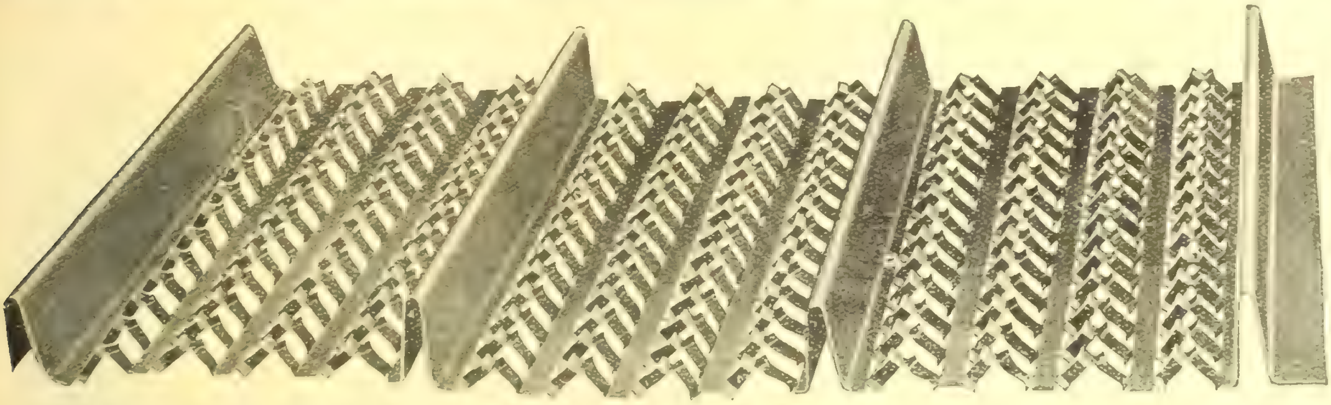
Head Office and Works :

Branches: **Toronto,** **Montreal,**

Pay us a visit at the Cement Show,

KAHN SYSTEM





Hy-Rib Partitions

HY-RIB does away entirely with the use of studs in partitions, thereby saving 5c. per square yard. Hy-Rib saves the expense of attaching sheets of lath to studs and is erected in much less time than the studs alone. The ribs are close together, giving greatest possible strength and rigidity. Hy-Rib sheets interlock at the sides and ends, making an absolutely continuous sheet of reinforcement throughout the partition.

The construction is very simple; set up the sheets vertically attach them at the top and bottom, plaster the sides and the partition is complete. Hy-Rib for partitions is a money-saver, space-saver, and a time-saver.

Hy-Rib catalogue, containing complete details, specifications, etc., free.

Hy-Rib Sidings

HY-RIB, plastered with cement, makes a solid wall about two inches thick, and costs considerably less than brick or masonry construction and is more economical than wood sheathing or corrugated iron. The Hy-Rib is merely plastered with a cement coating. No centering, studs or special equipment is necessary. Hy-Rib sidings are a permanent firepoof construction, which is erected at low cost and has an attractive modern appearance. Hy-Rib catalogue contains complete specifications and illustrations of application to buildings of all types.

Hy-Rib Roofs and Floors

HY-RIB does away with centering in concrete roofs and floors. Hy-Rib sheets are laid over the support and concrete poured in from above. The plaster is applied directly to the under-side and no centering whatever is required. Used with any type of beam, steel, wood or reinforced concrete. Furnished either in straight sheets, or bent to the desired curve to meet all conditions of roof or floor construction. Write for Hy-Rib catalogue, containing complete details, specifications, applications, etc.

Hy-Rib Ceilings

HY-RIB does away with the small channels, tees and angles, necessary where the ordinary type of lath is used, saving the expense of wiring lath to a large number of separate members. Hy-Rib presents a straight, true surface for plastering, and provides a perfect key which prevents any dropping of plaster. Hy-Rib saves time and labor, as its initial cost is lower than the ordinary lath and channels. Send for Hy-Rib catalogue, containing complete details and specifications.

COMPANY OF CANADA LIMITED

WALKERVILLE, ONT.
Winnipeg, **Vancouver**

St. Lawrence Arena, March 6th—11th

KAHN SYSTEM
Reinforced Concrete

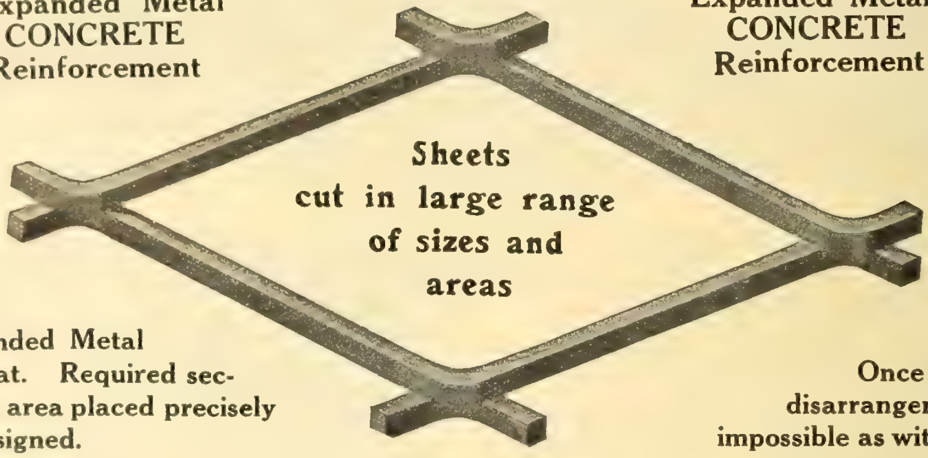
STEEL AND RAD

"Steelcrete"

Expanded Metal
CONCRETE
Reinforcement

Expanded Metal
CONCRETE
Reinforcement

Plain Round



Sheets cut in large range of sizes and areas

Expanded Metal lies flat. Required sectional area placed precisely as designed.

Once placed disarrangement is impossible as with rods.

Plain Square

The reinforcement for unskilled labor—reduces labor cost on job. A unit system expanded metal is world-wide adjunct to thin plates. Entire weight per square foot operative. Manufactured from best open-hearth steel plates. The automatic machine slits and opens the meshes simultaneously from the cold sheet, thus increasing the elastic limit and ultimate strength.

No "straightening out" ensues when load is applied to split the concrete before reinforcement comes into tension.

"Klutch" Bar

We make a specialty of concrete beam reinforcement and can supply rods and bars up to 66 feet in length fabricated ready for placing in beams, thus obviating expense and inconvenience to the contractor and ensuring a perfect job to both the architect and the owner. We strongly recommend our "Klutch" Bar to achitects and engineers. This bar, as supplied by us, is of open hearth medium steel, having an ultimate tensile strength of from 60,000 to 80,000 pounds. Owing to the very distinct deformations the stability of the structure is assured, as slipping of the bar is prevented under severe repeated loadings.

See our "CEMENT GUN" at the Cement Show

Head Office
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Show Rooms
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80 Adelaide St. West
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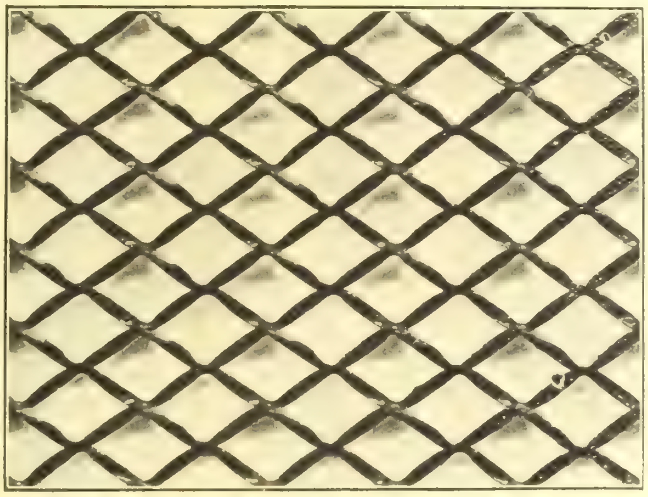
Use STEEL and

IATION LIMITED

T. Stud

"Steelcrete" Expanded Metal Lath

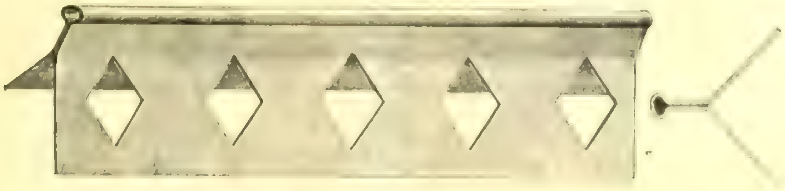
Studding, Furring, Corner Beads, etc.



Square Twist Mesh Lath

Our leading architects and builders have at last fully arrived at the conclusion that all good plaster work should be done on metal lath. The total cost of "Steelcrete" Expanded Metal Lath for even the largest building is as nothing compared with the annoyance and expense of replacing and renewing cracked, broken and stained plaster work done on wood or inferior metal laths.

The "Steelcrete" brand of Lath, which was the first Expanded Metal Lath made, was introduced in Canada by our Company twelve years ago, and since that time it has been used on the best work which has been done from Sydney, N.S., to Victoria, B.C. A uniform high standard of quality has been maintained, and this fact, which is well-known by our most experienced architects and builders, causes "Steelcrete" Expanded Metal Lath to be specified as the Standard to which all others strive to attain.



"Steelcrete" Plasterers' Corner Bead

Accessories to our "Steelcrete" Expanded Metal Lath. We [illegible] a very large and complete line of Steel Angles, Channels, Bars, Rods, etc., for use as Furring Studding, Hangers, Clips, etc. Our "Steelcrete" Plasterers' Corner Bead should be used on every external plastered angle in any building. It is invisible, but positively protects the corner from being chipped or broken aand insures straight lines. It can be bent to any angle and will protect arches as well as straight corners.

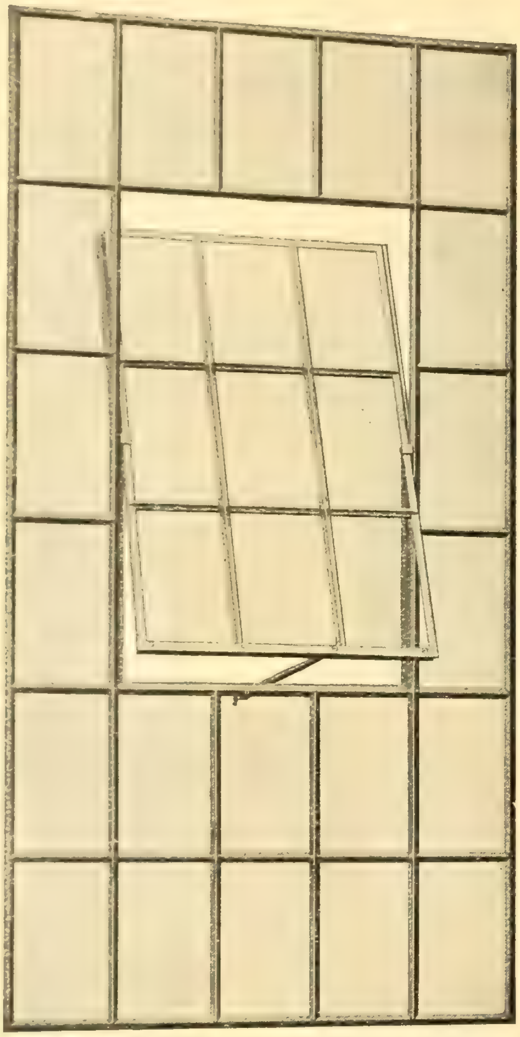
Channel Stud

The Most Talked of Feature at the New York and Chicago Shows

RADIATION Products

Sales Offices and stocks in all leading Canadian Cities.

STEEL AND RAD



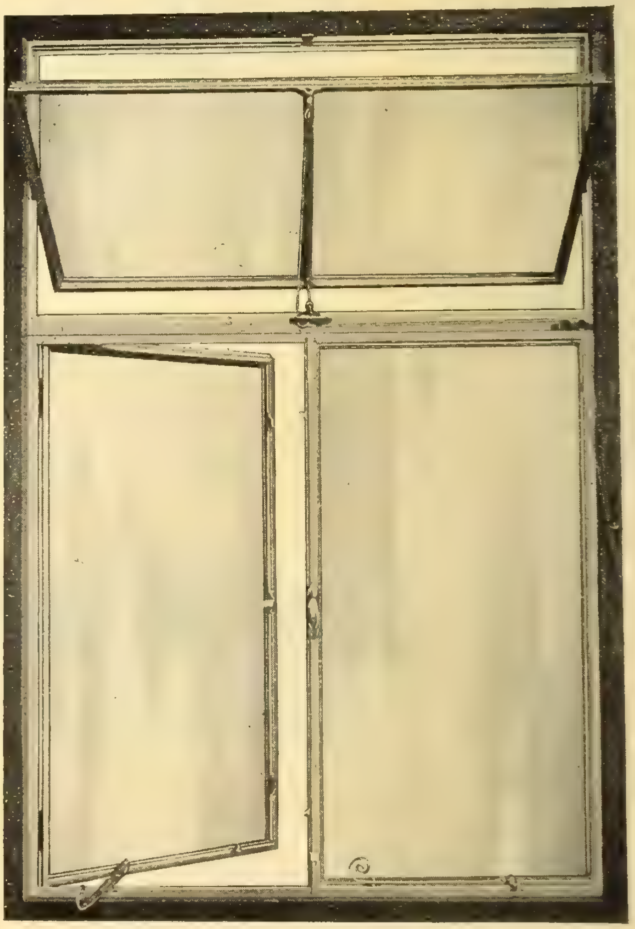
"FENESTRA" SASH also give a much larger glass area in a given opening than any wood or sheet steel frame.

Solid Steel Casements

are especially adapted to the better class of office, banking and public buildings, residences, etc.

This sash shipped complete, with individual opening and locking device, steel glazing pins, fixing lugs, bolts, etc.

The time is not far distant when practically every building will be equipped with *"FENESTRA"* fireproof windows. They cost very little more than wood sash and reduce your insurance rates.



High Grade Steel Casement

Use STEEL and

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Show Rooms:
Toronto, 92 King St. West. 80 Adelaide St. East

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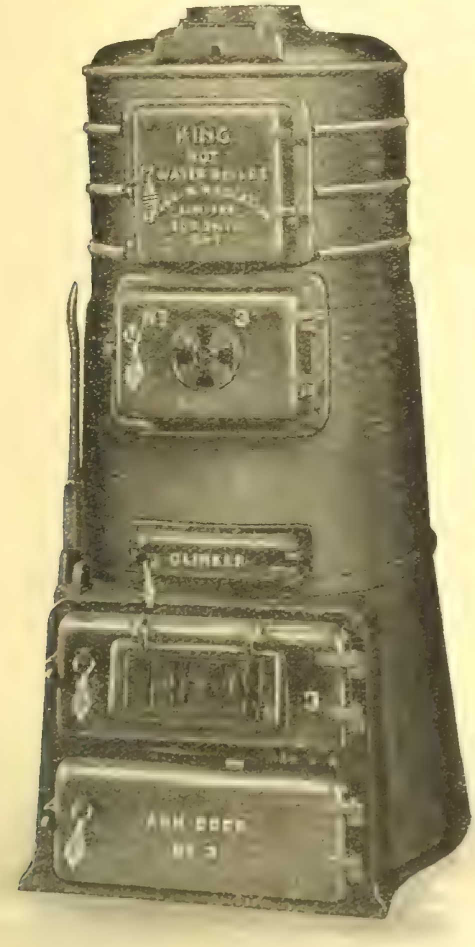


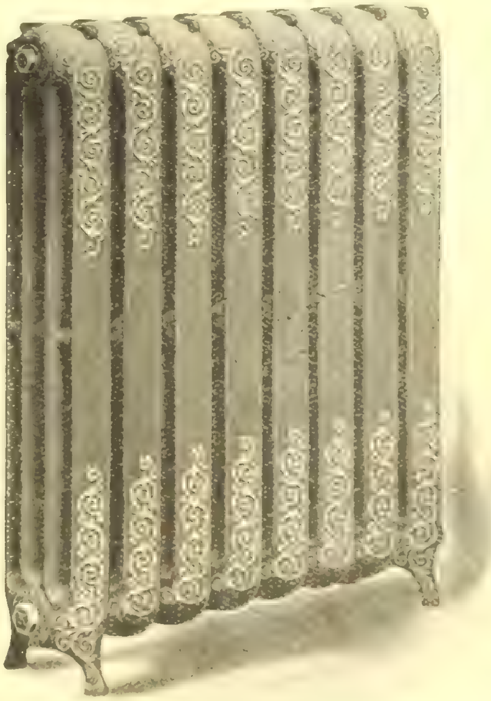
"King" High Base Boiler

"KING" BOILERS and "KING" RADIATORS

In placing the "KING" HOT WATER BOILER on the market, we do so with a knowledge that we have at last produced a boiler that combines the best materials, design, workmanship and finish with a PERFECT COMBUSTION and Internal Circulation, giving it greater heating power than any other boiler.

"KING" BOILERS are equipped with a special shaking apparatus that is a revelation to those who are only familiar with other grates.

See them at our Show Rooms.



4 Column

"King" Radiators

No Radiator on the market is more favorably known than the KING" RADIATOR, and none so satisfactory to those who have ed them. Why? Because we subject each Radiator to the most gid inspection possible and use every means in our power to detect id preclude the possibility of leakage, so that it is practically possible for a "KING" RADIATOR to leave our hands unless rfect.

"KING" RADIATORS are made in artistic styles of both plain id ornamental patterns. A feature of "KING" RADIATORS is e uniformity in the design of ornamentation, permitting the use in room of various heights and types.

On view at our Show Rooms.

¶ Insist on having "KING" Boilers and "KING" Radiators specified.

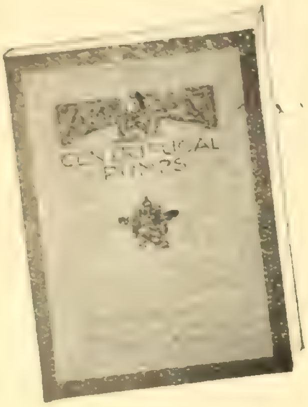
¶ We invite your inspection at our show rooms.

RADIATION Products

Sales Offices and stocks in all leading Canadian Cities.

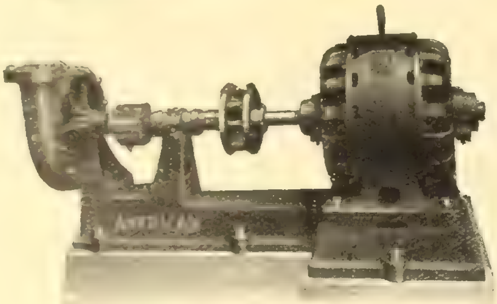
MONTREAL: 138 Craig St. West

Getting Hind-Sight Wise On A Pump



never pays for the dollars that are lost. It's foresight that counts.—Getting the right type of a pump and getting the right make of that type.

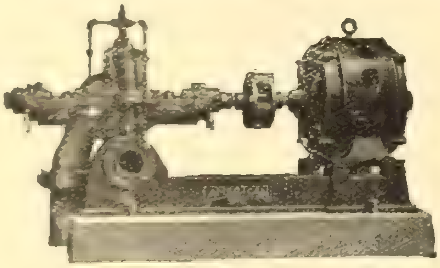
Substituting the highest development of the Centrifugal pump for antiquated valves and plungers is the modern way in pumping. Saves **first** cost, saves nearly all the expense of **attendance,** saves **repairs** and there's a mighty important saving when you figure the **total** cost after a period of years.



But the design for a Centrifugal Pump is so all-fired simple a lot of folks haven't the gumption to study out why a single stage Centrifugal of one make will produce only moderate efficiences on total heads up to 50 to 75 feet and another make will develop very high efficiences on 125 foot heads.

It is just that simplicity that's misleading. Every flow-line must be worked out to the easiest possible curve. Impeller and interior of casting must be machined true and adjusted to each other with precision.—It must be adjusted like a watch.

AMERICAN

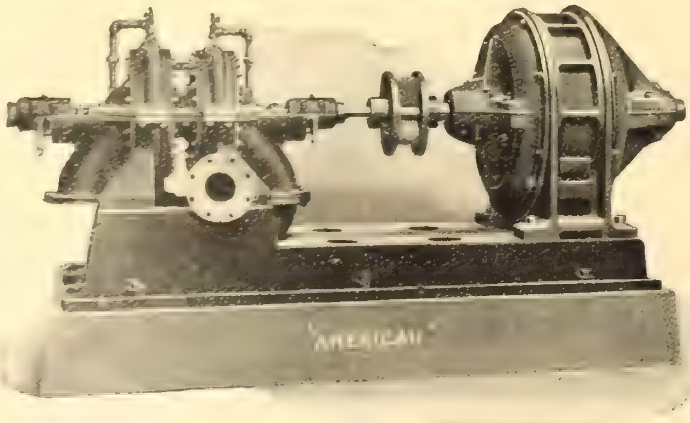


It's precisely for this reason that the "American" Centrifugal has won every gold medal at every national exposition held in this country during the past three years.

"American" Centrifugals have flow-lines refined to a degree in which there is not a possible swirl or eddy of fluid in passing through the entire pump. That's why they attain higher efficiences than any other Centrifugal.

"American" Centrifugals are made in every type, in any size, in any number of stages and equipped with any power.

Centrifugal Pump Catalogue No. 117, the most complete ever issued is yours for the asking. Get it before you buy a pump and get fore-sight.



The American Well Works

General Office and Works:
Aurora, Ill., U. S. A.

Chicago Office
First National Bank Building

Canadian Office:
Montreal, Que.

AMERICAN

Catalog Directory

Catalog 105—Well Drilling Machinery, 8 x 11 in. 196 pages.
Bulletin 106—Standard Types of Well Drilling Machines, 6 x 9 in., 36 pages.
Bulletin 107—Standard Types of Centrifugal Pumps, 3¼ x 6 in., 16 pages.
Bulletin 108—Centrifugal Turbine Pumps, 8 x 11 in., 8 pages.
Bulletin 109—Sand and Dredge Pumps, 8 x 11 in., 8 pages.
Catalog 110—Deep Well Pumps, 8 x 11 in., 68 pages.
Bulletin 110 A—Standard Types of Deep Well Pumps, 3¼ x 6 in., 16 pages.
Bulletin 114—Rock Coring and Deep Blast Hole Drilling, 8 x 11 in., 16 pages.
Catalog 115—Air Compressors, 8 x 11 in., 84 pages.
Bulletin 116—Double Suction Enclosed Runner Centrifugal Pumps, 8 x 11 in., 8 pages.
Catalog 117—Centrifugal Pumps, Volute and Turbine, 8 x 11 in., 132 pages.
Cost of Irrigation—3¼ x 6 in., 20 pages

When All Other Drilling Machines Fail

"American" Machines Do The Work

The Beaumont, Texas, oil field was developed by "American" drilling machines after a half dozen other makes of machines had failed completely and did not succeed in putting down a single well in the caving quicksands encountered in that locality.

The reason why "American" Drilling machines succeed where others fail is because of our unequalled experience of 41 years in manufacturing drilling machines for every purpose and no matter what the conditions we have a machine especially designed to meet the requirements.

That's the difference that has made the "American" Trade Mark famous.

We make machines of every size, equipped with any power operated by hydraulic, jetting or spudding processes.

Our deep blast hole machines sink holes for quarry work more economically than any other machine.

Our coring machines combined with our adamantine process remove large cores at less expense than any other method.

New 8 x 11-inch, 198-page complete drilling machine catalog mailed free.
Be sure you get it before you buy any kind of a Drilling Machine.

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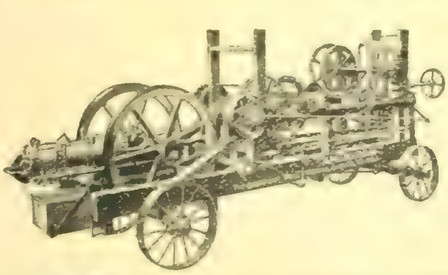

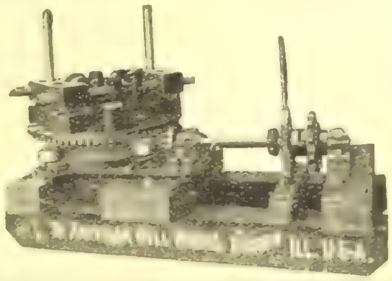

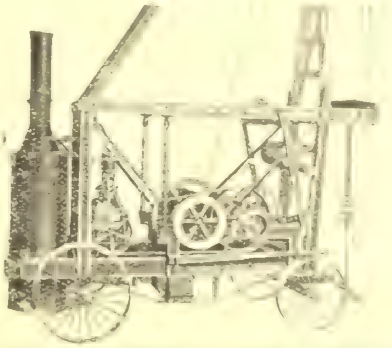

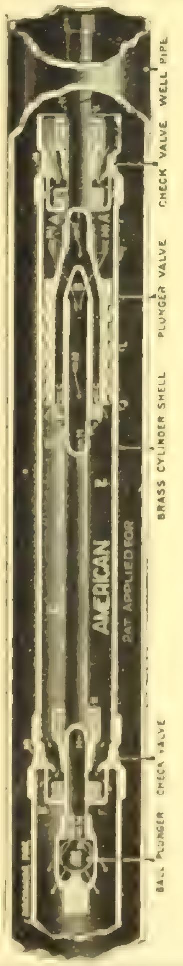

Largest Capacity, Fewest Repairs

That's an "American" Deep Well Pump

It's pure egotism but we have been upholding it for 41 years and we are willing to prove righ now, or any time you are ready, that no other deep well pump in existence equals an "American" in the two greatest essentials—largest amount of water with least repairs to the pump.

That's why the **"American"** trade mark on a deep well pump means something—there's a reputation behind it, and you can depend upon it, that reputation is faithfully guarded.

"American" water cylinders, both single acting and double acting, are all brass, with solid brass ball valves Cost more to build, but the reason we use them is they are best.

Valves to **"American"** pumps are so designed that they can be drawn from the well with the plunger rods without disturbing the well casing. It's a little more expensive to build them this way but mighty convenient in use.

If you require deep well pumps for any purpose, pin your faith to a pump of known quality the **"American."**

Built in any size, equipped with steam heads, pump jacks or geared direct to motor.

Write for the most complete Deep Well Catalog ever issued, No 110

THE AMERICAN WELL WORKS

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"TOXEMENT"

(Patented)

A Material in Powder Form for economical and reliable waterproofing of concrete or cement mortar against pressure.

"CEMENT FILLER" and "CEMENT FLOOR PAINT"

(Patented)

A treatment which will make cement floors water, oil and grease proof and will prevent dusting.

R. I. W. Damp Resisting Paints

for damp-proofing brickwork, concrete and metals.

TOCH BROS.

320 FIFTH AVE.,
NEW YORK

CHILLAS-BLACK, Limited Toronto	E. F. DARTNELL Montreal	DUNN BROS. Winnipeg	WM. N. O'NEIL Vancouver, B. C.

James Langmuir & Co., Limited

Offer Two Specialties

for

Architects, Builders and Contractors

CEMENT FILLER

Designed especially for new Cement Floors
Neutralizes all Caustic Lime
Renders Surfaces Damp-Proof
Allays Dust and Stops Suction

Prepares Surface for Finishing in Color
Also Possesses High Insulating Property, making it of value on Brick Work of Oil Switches.

CEMENT FINISH

A preparation to follow the Cement Filler
Protects the Cement Filler from Abrasion

A finishing coat to decorate the surface
Made in Grey or other desirable colors

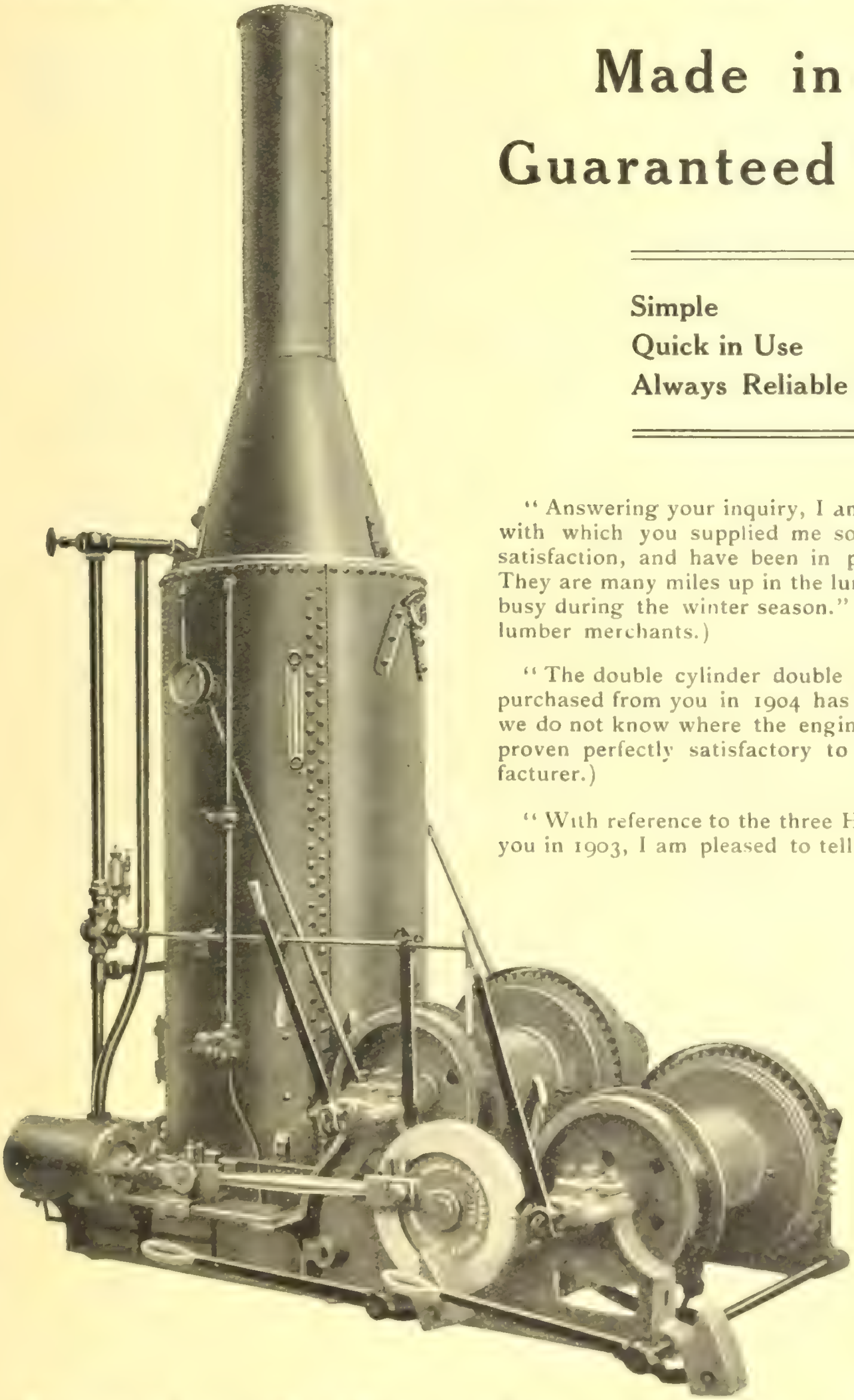
Also Makers of

High Grade Colors in Oil and Japan, Interior Decorative Stains, Interior and Exterior Enamels, Varnishes and Shingle Stains

1372 - 1376 BATHURST STREET
TORONTO, ONTARIO

1911 MODEL

Improved Hoisting Engine



Made in Canada
Guaranteed in Canada

Simple	Strong
Quick in Use	Compact
Always Reliable	Durable

"Answering your inquiry, I am pleased to state that the hoists with which you supplied me some years ago have given good satisfaction, and have been in pretty constant use ever since. They are many miles up in the lumber camps, and are kept very busy during the winter season." (From one of Canada's largest lumber merchants.)

"The double cylinder double drum hoisting engine which we purchased from you in 1904 has given us good satisfaction and we do not know where the engine could be improved, as it has proven perfectly satisfactory to us." (From a cement manufacturer.)

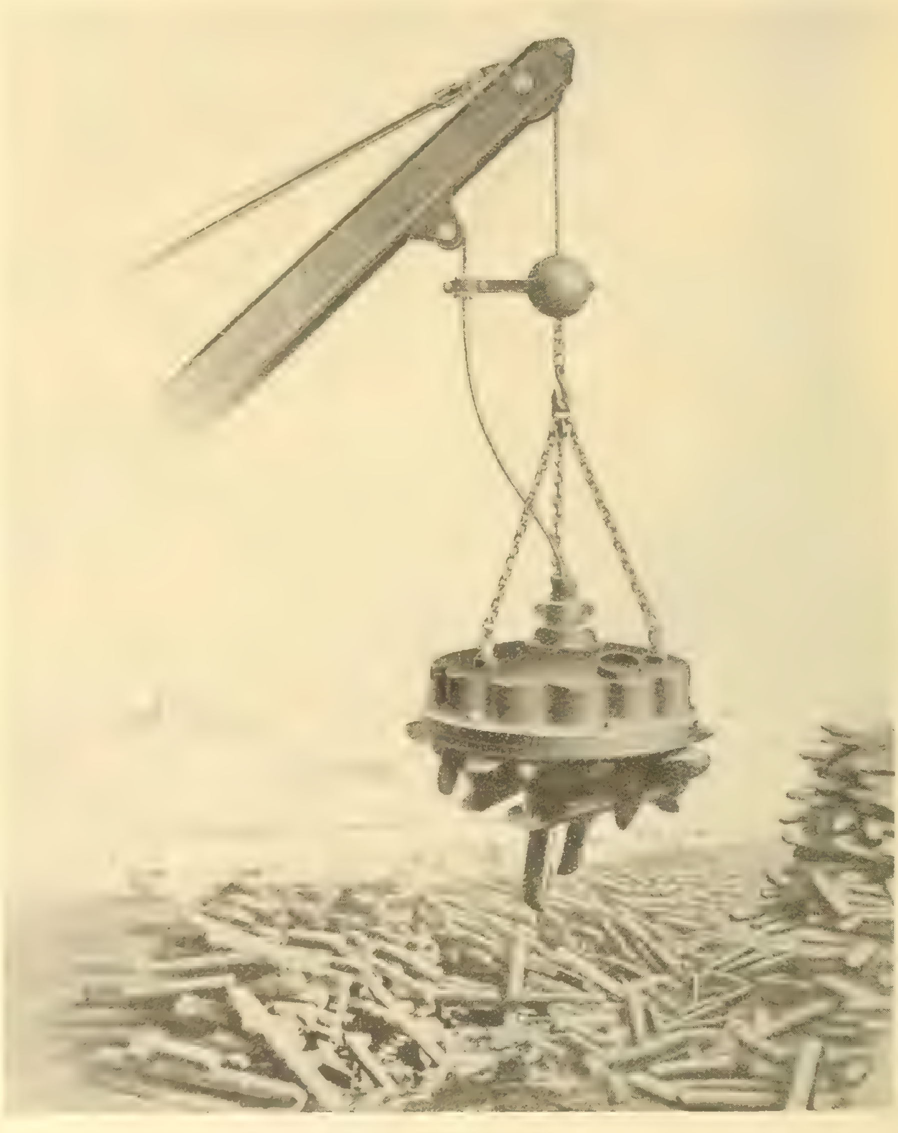
"With reference to the three Hoisting Engines we bought from you in 1903, I am pleased to tell you that we found these machines all that could be desired, and we have two of them in use yet. We sold one of them a year ago for about the price we paid you for it. Speaking in general terms, they are a first class machine." (From a large Railway Contractor.)

"Re the Hoisting Engines that we bought from you in 1898 we are very pleased to state that they gave us entire satisfaction, and that we disposed of them to good advantage after getting through with them." (From an excavating Contractor who had six of our Hoists on one job.)

Marsh & Henthorn Limited, Belleville, Ont.

Makers of Hoisting Machinery. **Sales Agents: MUSSENS Limited, Montreal.**

Lifting Magnets



The "WITTON-KRAMER" electric lifting magnets are the greatest labor-saving invention of the day. The various uses to which these magnets can be put will effect a saving every time. In the handling of small articles such as pig iron, scrap iron, sheet iron scrap, iron filings, sheet iron stampings, steel turnings and many other articles they save time and money.

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Sole Canadian Agents:

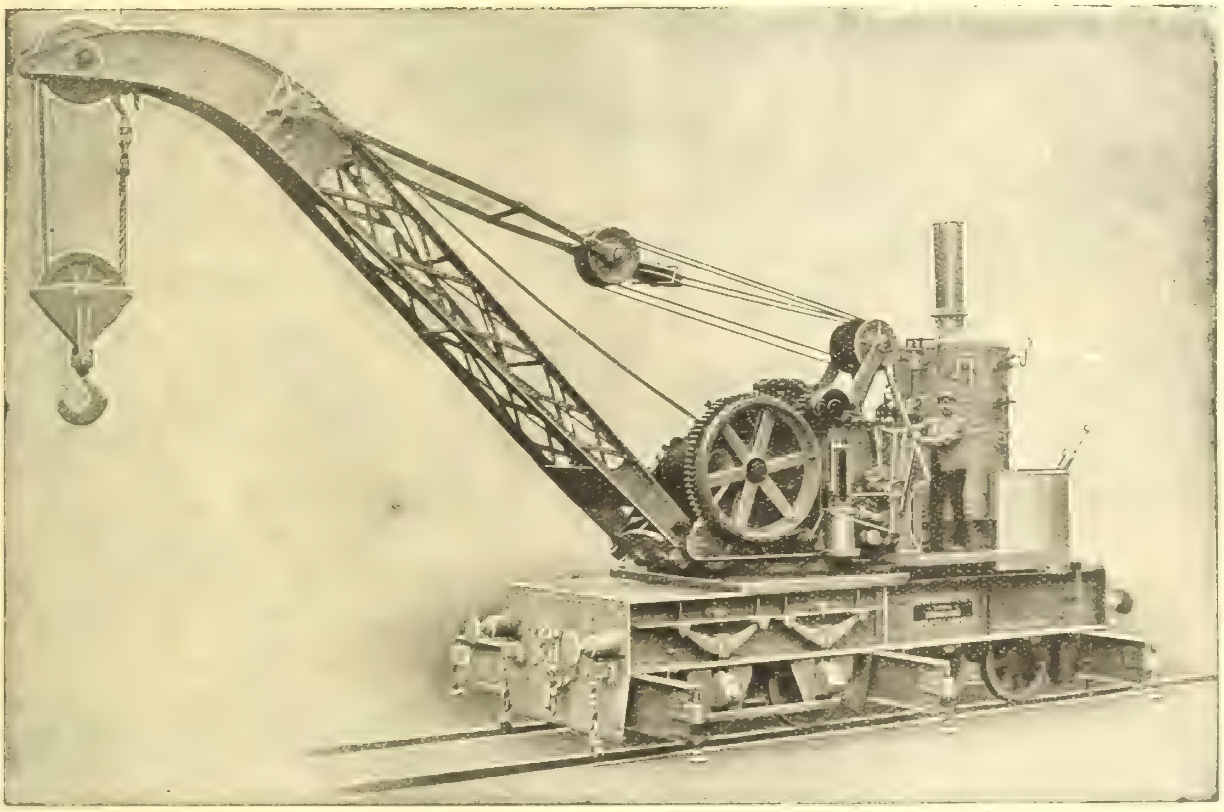
Factory Products Limited

Nicholls Building, 220 King St. West - - TORONTO, ONT.

Stothert & Pitt

Travelling Cranes

Hoisting Machinery and Harbour Equipment



General Electric Company

Limited

London, Eng.

Manufacturers of

Electric Motors and Generators

Electric Supplies Incandescent Lamps

Osram Tungsten Lamps, etc., etc.

Pirelli, Limited

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Insulated Wires and Cables

Automobile Tyres

Aero and Balloon Cloths

etc., etc.

Oxy-Acetylene Welding Apparatus, Sherardizing Process of Rust-Proofing Metals, Babbitts

SOLE CANADIAN AGENTS:

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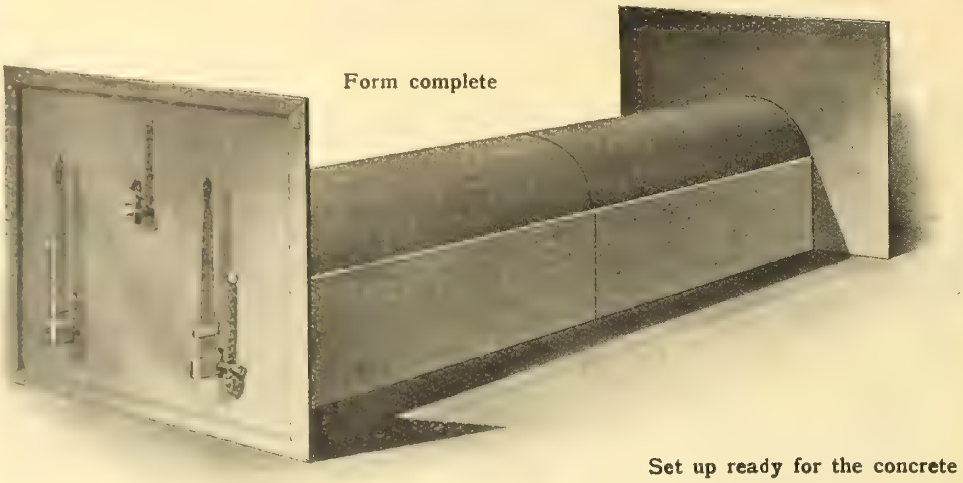
Collapsible Steel Forms

for the Building of



Form complete

Set up ready for the concrete

Culverts
Conduits
Flumes
Sewers
Small
Bridges
Etc.

The Collapsible Steel Forms manufactured by the Concrete Form and Engine Co. are the lightest, strongest, easiest handled and most practical on the market, as has been demonstrated in actual operation throughout all portions of the country. **Not a single failure since their introduction.** Our culvert forms make a culvert of greater carrying capacity, greater strength, and can be built much cheaper than over a full circular form. A sewer over our forms has a carrying capacity one-fifth greater than the round shape.

For full particulars, write to-day for new illustrated booklet. **It will save and make you money.** Contains the endorsement of competent authority on highway construction and public improvements.

36" 1700' Trunk Line Sewer built at Carson City, Mich., at a cost of 78c. per foot, including excavating and back filling.

Culvert complete, showing form with end plates down and form ready to be collapsed. One man can withdraw it.

Write for our Engine Catalogue.

Concrete Form & Engine Co., Detroit, Mich., U.S.A.

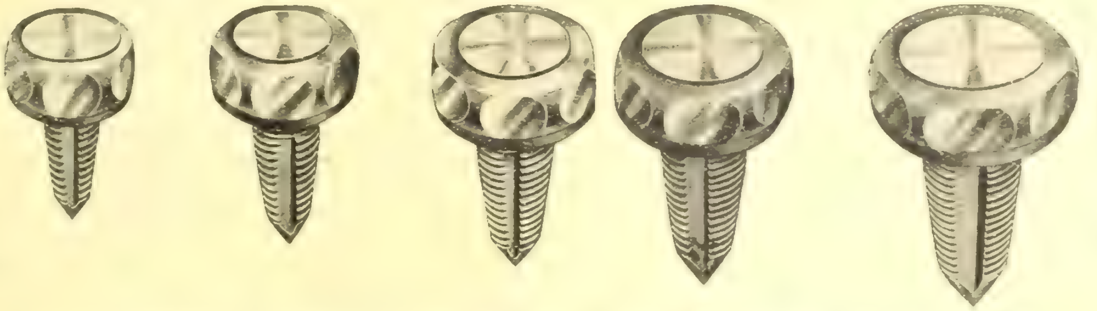
Successors to

Collapsible Steel Form Co. and New Belle Isle Motor Co.

Detroit, Michigan - - - - - Carson City, Michigan.

Wolverine Tap Plugs

Made of Tool Steel Tempered

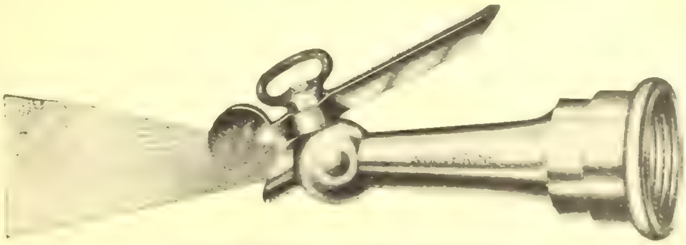


Cuts are Actual Size

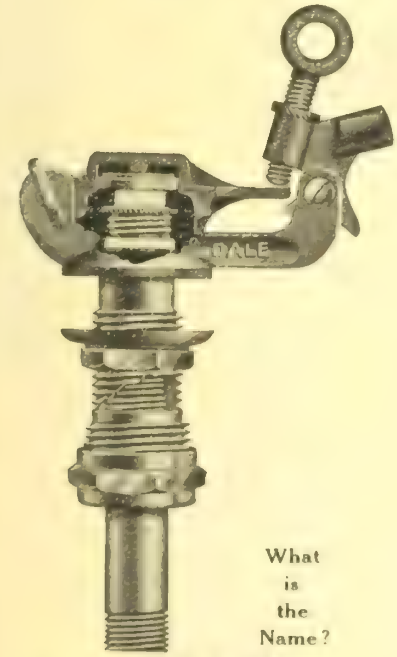
For Repairing Leaks in any Boiler, Tank, Radiator, Soil Pipe, Etc.

Note milled slot giving perfectly sharp cutting edge. A tool and a repair in itself. All you need is a wrench.

RUBBER STOPPERS
Will fit any Basin or Bath



WOLVERINE HOSE NOZZLE
Will throw straight stream, fine or wide spray. Causing no back pressure on hose

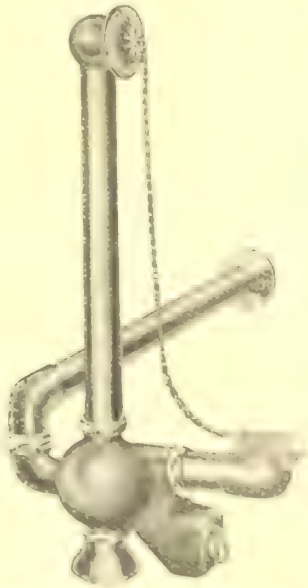


What is the Name?

"THE DALE"
With the indestructible Porcelain Seat for High or Low Tank

N. P. BRASS NAME PLATES
Stamped or Cast
Many kinds

Write us



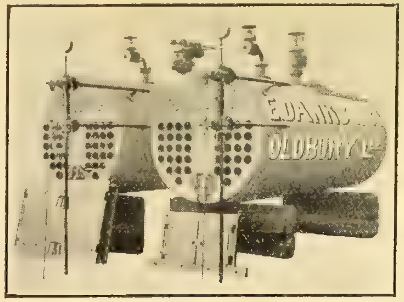
Waste and Overflow with
Trap all above floor
Plain or Vented
Accessible for cleaning

Manufactured by

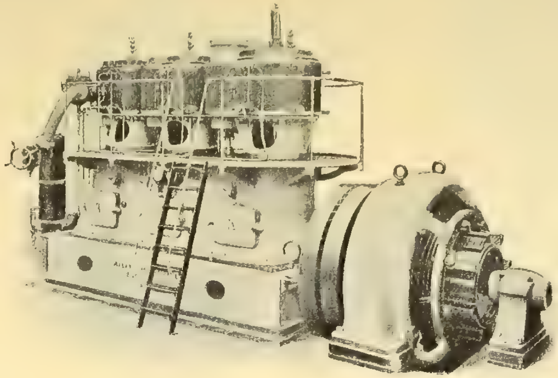
CANADIAN WOLVERINE CO., Limited

CHATHAM, ONT.

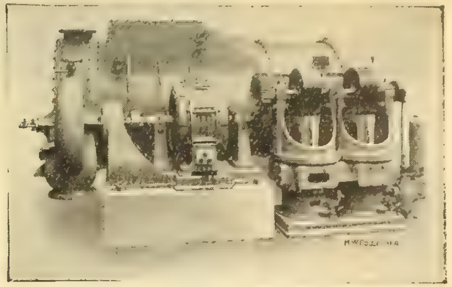
COMPLETE INSTALLATIONS



Ed. Danks Boilers
of every description



Alley and McLellan
Enclosed Forced Lubricated Steam Engine

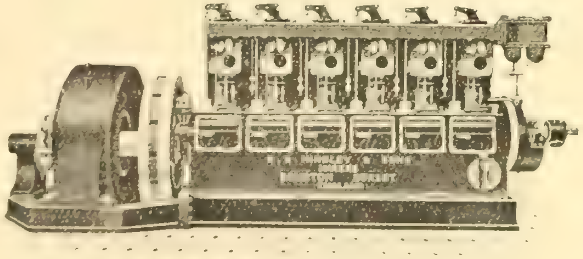


Mirrlees Watson Condensers
Surface - Jet - Barometric

All Types of

Economizers - Steam Boilers - Superheaters

WATER TUBE SPECIALTY



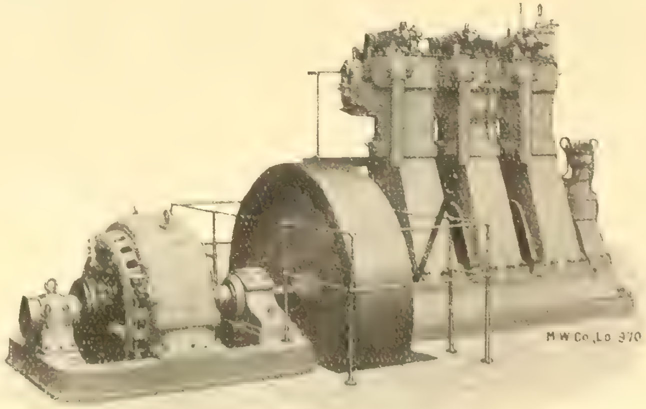
Vertical High-Speed Gas Engine

Willans
Steam Turbines

The Canadian Boving Co.

164 Bay St., TORONTO

Vancouver Office: 427 SEYMOUR STREET
H. W. KENT, Manager.

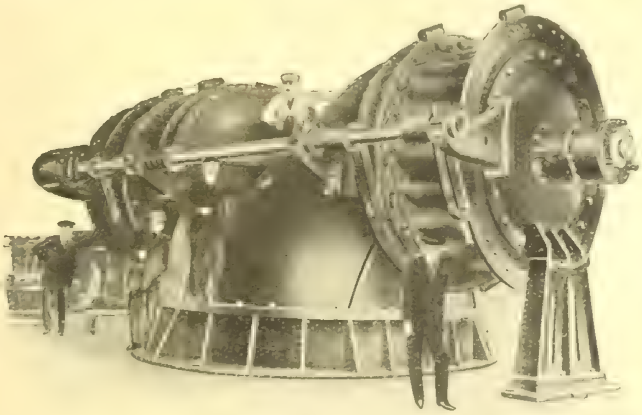


Mirrlees-Diesel Crude Oil Engine

PUMPS OF EVERY DESCRIPTION

The Canadian Boving Company
Limited
164 BAY STREET, TORONTO

Water Wheels Turbo-Pumps



The illustration shows one of five waterwheel units supplied to the City of Winnipeg, each developing 5200 B. H. P. under a head of 45 feet, The speed is 164 r. p. m.

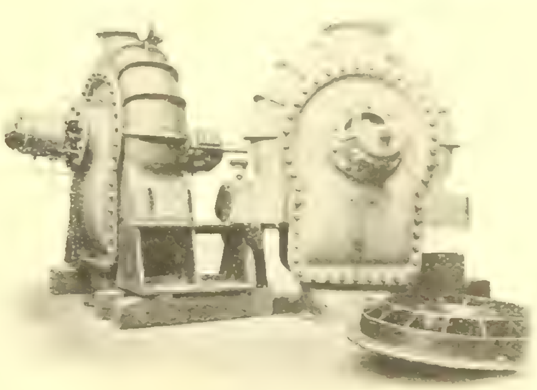
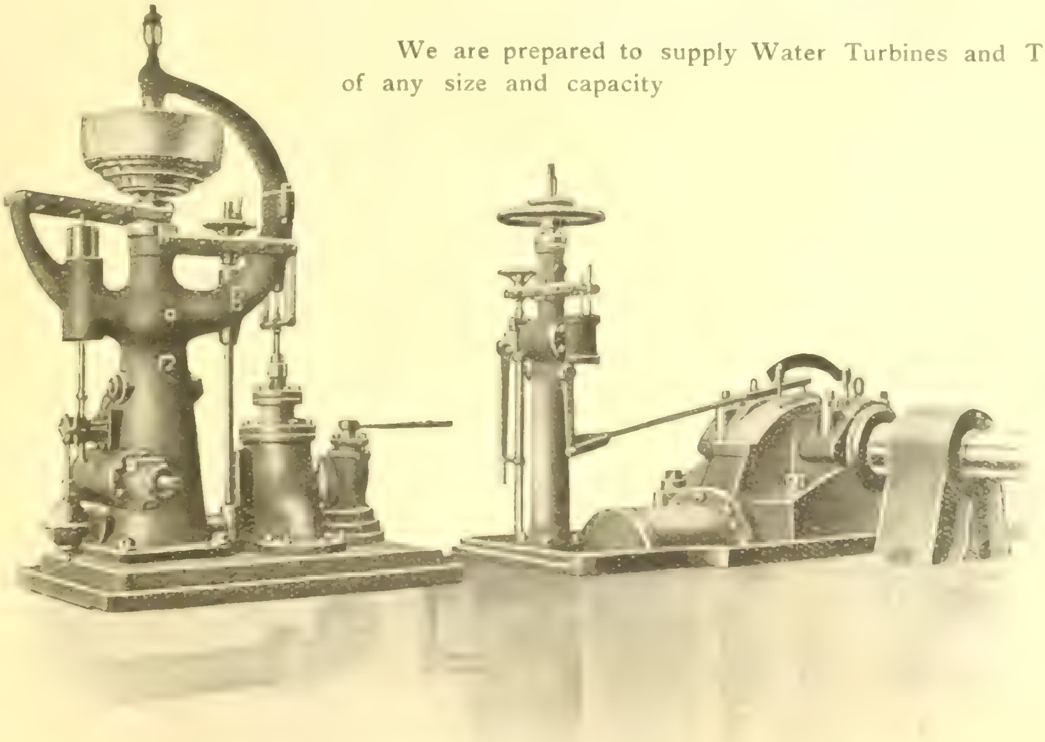


Illustration of two pumps supplied for Toronto City, each delivering 9400 g p m. against 250 feet head at 750 r p m. Power required 890 h. p. Overload Capacity 1500 h. p.

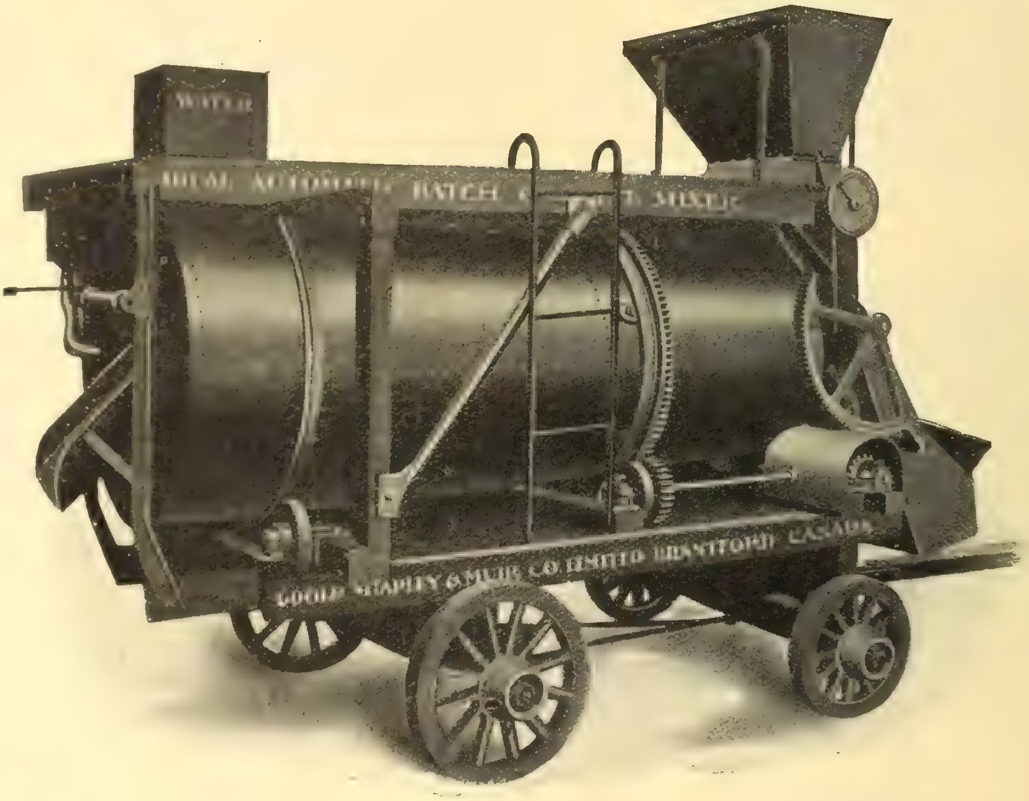
We are prepared to supply Water Turbines and Turbo-Pumps of any size and capacity



The above illustration shows the type of Governor we supply with above illustrated Turbine.

We manufacture seven different sizes of Oil Pressure Governors suitable for any requirements, and also to fit Turbines of other make than our own.

Concrete Mixers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IDEAL AUTOMATIC BATCH CONCRETE MIXER
GOOLD SHAPLEY & MUIR CO. LIMITED BRANTFORD CANADA

Our 1911 machine has all steel frame, Heavy Steel Gears; is the most up-to-date mixer made. It is a money maker. We make

Tanks and Towers

for all purposes and any sizes. Gas and Gasoline Engines, etc. . . . .

Write for Catalogues.

The
Goold Shapley & Muir Co.
Brantford - Canada **Limited**

Our Policy like many of Our Wares—is Transparent. It is to Make the Best Glass, And We Do It.

This

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Trade Mark

Means ☛ **British Window Glass**

We Make

Sheet, Polished Plate, Silvered Plate, Bevelled Plate, Patent Rolled, Rolled Cathedral, Figured Rolled, Patent Wired Rolled, Wired Cast, Polished Wired Glass, Rough Cast Plate, Double Rolled White Cast, Patent Prismatic Rolled Glass.

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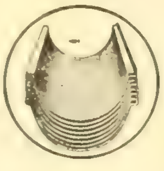
Read why PEDLAR NESTABLE CULVERT

saves farmers money
lowers taxes—betters roads

THESE culverts of mine are a great thing for the farming world. They not only make good roads possible, but they serve the farmer in many other ways. And they are so simply laid. They come nested like this:



This compactness saves freight and makes it easy to handle them. You put the sections together like this:

Then you clamp the flanges together like this:

And you've got a piping that will outlast anything of the kind there is. Better get the book and sample and study it.

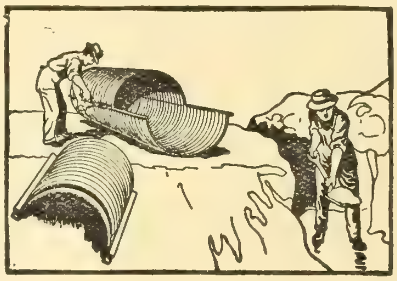
G. H. Pedlar

GET your township reeve or warden to study Pedlar Culverts. Send for the Free Book and show him why this Culvert surpasses for all ditch drainage, for restraining small streams, for every use that any culvert can serve. You will profit through lowered taxes, better roads and abolished washouts. Send for the book and interest your township's officials. You will benefit by what they will learn.

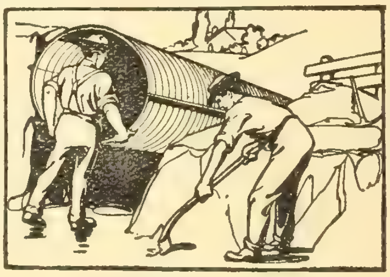
For a very moderate cost you can instal a perfect sewage-disposal system on your farm, using a suitably-sized Pedlar Culvert. You can realize the full value of the liquid manure your animals produce by draining your stable floors with Pedlar Culvert—and that highly valuable manure is usually wasted on farms. Pedlar Culvert makes it easy to water your cattle in winter. And there are a score of other uses for it on the farm.

Nothing vies with Pedlar Culvert as a well-curbing or a cistern lining. The thick galvanizing absolutely protects the metal of these Culverts from rust or corrosion, and the metal itself protects the water supply from contamination. For draining swampy spots around the farm, or for irrigation ditches and under-drains Pedlar Culverts far excel tile or cement piping, are much less costly, much easier to instal and infinitely more durable.

Pedlar Culvert is made in every standard size from 8 to 72 inches diameter, of Special Billet Iron of the the best quality, in extra heavy gauge. This Billet Iron is curved into semi-cylinders—curved while cold, so the sizes never vary a fraction. These half-cylinders are then corrugated by a pressure of sixty tons to the square inch. After being corrugated, the whole surface and each edge is heavily galvanized and made positively rust-proof.



A few hours' work—no special skill needed—and an indestructible culvert is in place ready for use.



PEDLAR CULVERT

is made in Nestable Sections from the Best Billet Iron, heavily galvanized and deeply corrugated.

It is the simplest kind of work to put these half-sections of Pedlar Culvert together permanently. One half-cylinder is placed on another, and the flange-rib on each side is rigidly compressed flat by the huge pressure exerted by a simple but effective tool. No bolts, no rivets, no make-shifts—but a triple-thick locking rib-flange that gives Pedlar Culvert immense strength. Thus it will stand crushing strains that would destroy any other piping.

This peculiar flat-flange, triple-thick rib makes the most perfect joint possible—nearly as good as if it were welded. Yet it allows for expansion and contraction under heat or cold. Thus a Pedlar Culvert will not spring nor split even though frozen solidly full of ice. Also the triple rib flange principle makes it possible to break joints in putting this Culvert together, something you cannot do with any other culvert or with cement piping or tile.

Pedlar Culverts are the most portable, as well as the most durable of any piping for any purpose. Being made in half cylinders, they are nestable—so that a great many linear feet of culvert occupy but few cubic feet of car or wagon space. This economizes freight and carriage costs, and makes it easy to transport this Culvert even in rough country. You should get the free book and sample culvert that makes the whole story clear. State your possible needs when you write for the book, and let us quote prices.

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And Sample Culvert

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THE PEDLAR PEOPLE
OF OSHAWA, . . CANADA

(Largest Sheet Metal Manufactory in the British Empire)

The Pedlar People of Oshawa
Ontario, Canada

include in the output of their immense factory the below-mentioned specialties in sheet metal building material. Samples, descriptions and prices of any of these will be readily forwarded postpaid and free upon request addressed to the Pedlar warehouse nearest to the inquirer:

Pedlar Nestable Culvert, Oshawa Steel Shingles, Steel Roofing, Corrugated Iron, Metal Shutters, Skylights, Conductor Pipes, Finials, Art Steel Ceilings, Art Steel Siding, Eave Troughs, Prepared Roofing, Metal Doors, Metal Lath, Ventilators, etc.

FERRO-DOVETAIL

ROOFS AND FLOORS

For Rapid, Permanent Fireproof Construction

PEDLAR Ferro-Dovetail Plates solve the problem of the architect, engineer or builder who wants to economically erect fireproof floors and ceilings. Ferro-Dovetail plates abolish the need of wooden centerings for concrete floor slabs on a steel superstructure. To use Ferro-Dovetail Plates, it is merely necessary to lay out the steel arrangement to a maximum of 5′ 6″ or 6′ spans; Ferro-Dovetail Plates come in sheets to fit these spans, allowing a 3″ end lap. At this end lap, the corrugations are spread so that the sheets will interlock. The contractor lays

PEDLAR

Ferro-Dovetail Plates

for the steel superstructure, just as he would lay planks, lapping and interlocking the plates at the edges. As soon as this is done all that is necessary is for him to have a plank runway for his wheelbarrows and he may then apply his concrete to the desired depth of slab.

As soon as the concrete has set, the plasterer steps in on the job and plasters the underneath side of the Ferro-Dovetail Plates, using ordinary plaster with a good proportion of hair in the grounds. Ferro-Dovetail Plates are then thoroughly imbedded, after which the ceiling is properly finished and plastered.

Pedlar Ferro-Dovetail Plates being thus protected by the cement and plaster will last forever. The cement and plaster being bonded and reinforced by the steel, cannot disintegrate or fall off.

For roofing, Ferro-Dovetail Slabs can be waterproofed with felt roofing, mastic Asphalt or other good roof covering.

There is not an ounce of combustible material in a Ferro-Dovetail roof and because of that, fire insurance underwriters make rate concessions upon buildings upon which they are used.

Ferro Dovetail roofs are especially suitable for buildings exposed to smoke, acid fumes, gases, condensation or moisture—in short, for such places as manufacturing plants, chemical works, rolling mills, galvanizing plants, plating works, foundries, round houses, train sheds, breweries, power houses, etc.

If you are interested we will be glad to send you our new book on Pedlar Ferro-Dovetail Plates, **free on request.** Ask for bulletin No. 52.

The PEDLAR PEOPLE of Oshawa

Established 1861 — Established 1861

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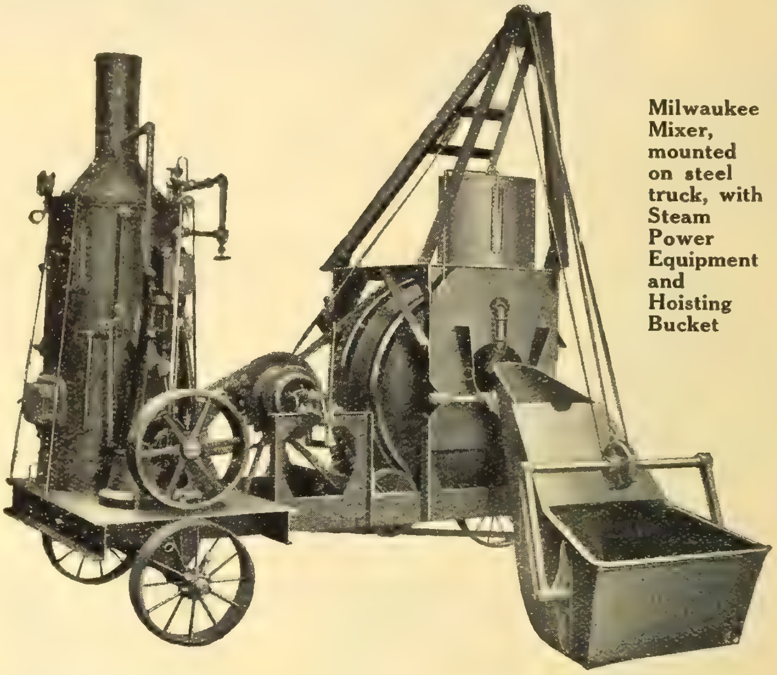
WE WANT AGENTS IN SOME SECTIONS
MENTION THIS PAPER



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Rosebery's Unequaled Proposition and one that is booking the orders. Write for 1911 Catalogue. Just out.

Milwaukee Mixer, mounted on steel truck, with Steam Power Equipment and Hoisting Bucket

OUR PROPOSITION

WE will put a Milwaukee Mixer on your work for a period of five days. You are at liberty to test it thoroughly in every kind of work. If, at the expiration of this time, you are not fully convinced that it is all we claim and superior to any concrete mixer in the market, return it to us and we will pay the freight both ways.

No firm ever made, or can make, a more straightforward offer than this, as it will not cost you a cent if we fail to convince you of the superiority of the MILWAUKEE CONCRETE MIXER.

Milwawkee Concrete Mixer and Machinery Co. - Milwaukee, Wis., U. S. A.

CANADIAN REPRESENTATIVES :

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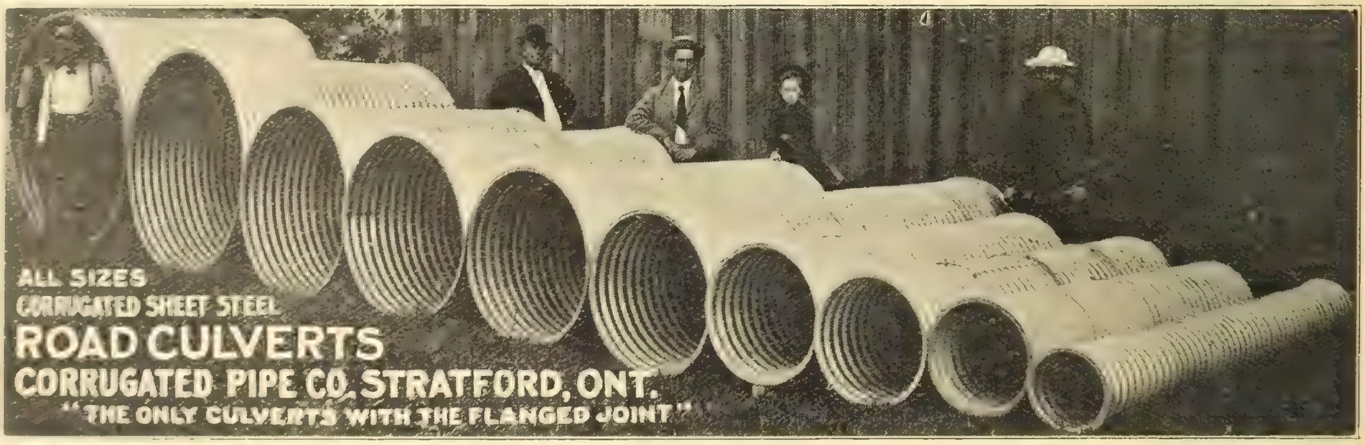
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CORRUGATED SHEET STEEL
ROAD CULVERTS
CORRUGATED PIPE CO. STRATFORD, ONT.
"THE ONLY CULVERTS WITH THE FLANGED JOINT"

The pipe we make has been actually proved to be the leading corrugated pipe on the market. 25% stronger than any other. It is unusually strong and chemical tests show it to be proof against corrosion. All our pipe guaranteed absolutely for 20 years. Our catalogue will give you some valuable information about corrugated pipe ; where can we send you a copy?

You need the best in your roads and can get it from the

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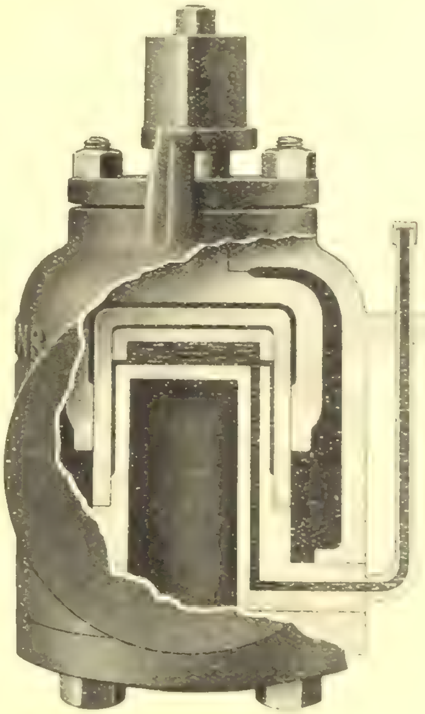
Rothchild Rotary-Gate Valve

The Valve that stands Hard Work

WHEN we send you a Rothchild Rotary-Gate Valve we ship it under a **GUARANTEE**—a guarantee to stand the most severe high pressure boiler blow-off service **WITHOUT ADJUSTMENT, RENEWING of PARTS or REPAIRS of ANY KIND.** That is a strong guarantee, but it backs up a strong valve. This is the only valve made which will positively **HOLD** steam, water, ammonia, gas, air, oil or other fluids, hot or cold **WITHOUT ANY ADJUSTMENT, REPAIRS or REPLACING OF PARTS.** It is a radical improvement in its line and works upon **ENTIRELY REVERSED PRINCIPLES** to *any other* valve. The gates are entirely surrounded by a uniform pressure, automatically taking up their own wear and keeping a **PERFECT SEAT ALL THE TIME.**

There is no undue strain on the seating parts. They are never damaged by differential expansion and are thoroughly protected from the destructive current when blowing off.



For GOOD service LONG service and SAVING MONEY there is no valve like this one.

The fact that this valve has completely solved problems considered unsurmountable in the past, has led many leading engineers throughout the country to specify it generously and would seem to warrant your full consideration as to the superior comparative merits of the valve for the purpose of specifying it where the best is demanded.

We can give you the names of world-famous firms which are of the same opinion.

Blow-Off Valve

One of the features of this valve is its oiling device. The tube on the side is connected with an oil well on the inside of the valve which lubricates the rotating gates, insuring a free opening and closing and obviating any tendency to stick on its seat. This oil well is of ample proportions and will supply oil to the gates for several months. The oil well can be refilled after the boiler has been blown down by removing the cap on the tube and filling with an ordinary oil can.

A packing gland is located on the stem of the valve which prevents all leakage at this point.

At the back of the valve is a clean-out plug. By removing this plug when cleaning the boiler, a rod can be passed through the parts of the valve into the back connection for the purpose of removing all scale and sediment which has accumulated in the blow-out pipe.

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Saver
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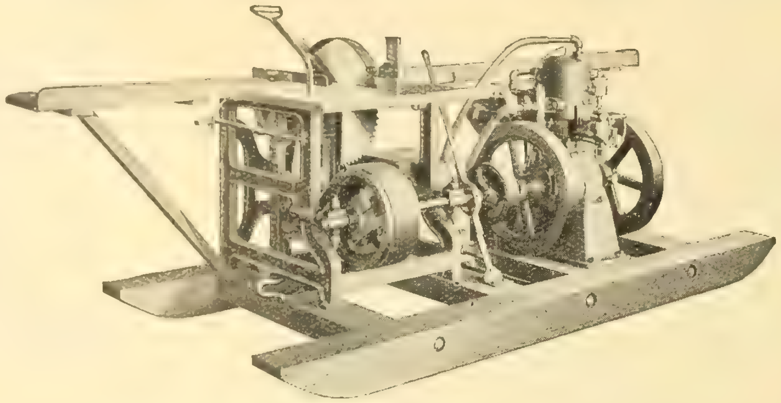

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The Oshkosh Portable Saw Rig

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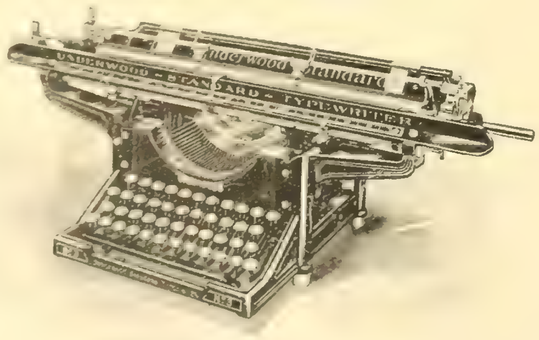

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12, 14, 16, 18, 20 and 26 inches
Specially built frame for every width.

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Underwood Condensed Biller
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Saves one firm $2,500 a year.

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Engineers and Contractors

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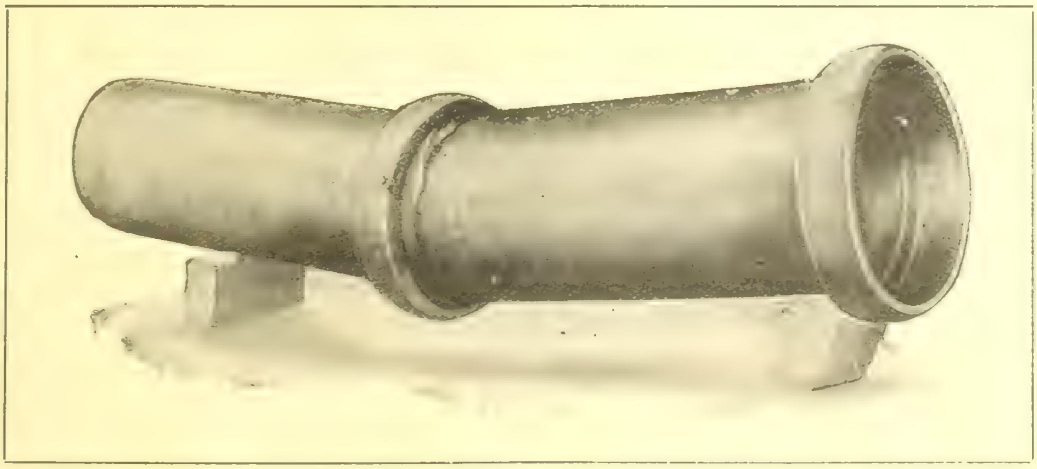

G.-K.
Sewer Joint Compound

Makes a tight sewer, even with water in trench.
No delay in construction. Write for booklet.

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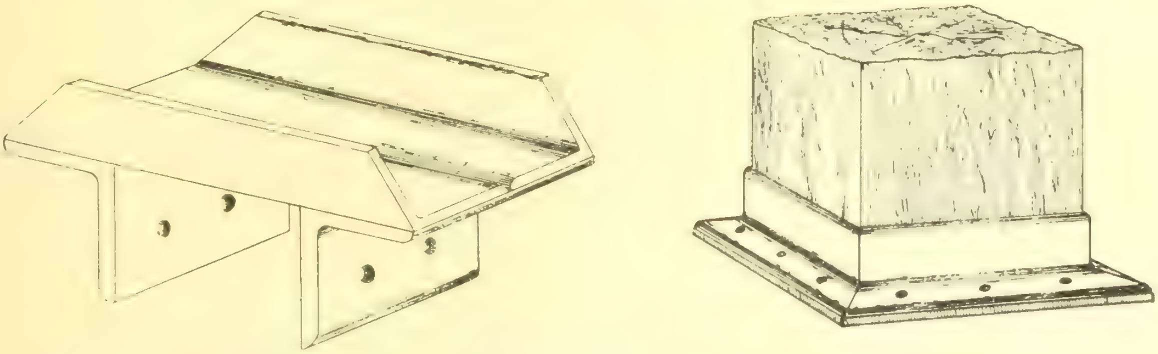
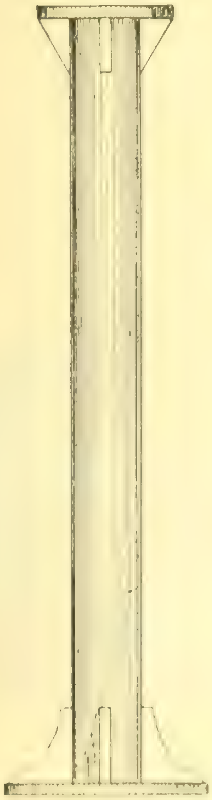
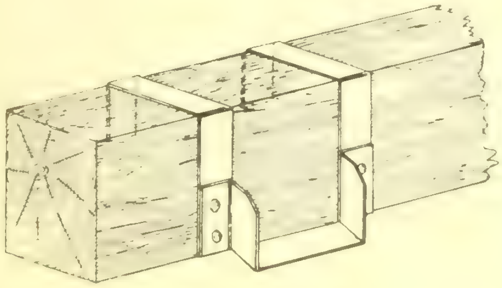


STEEL POST CAPS and Bases for Wooden Posts, any size. Also made in Cast Iron



CAST IRON COLUMNS
all sizes and designs



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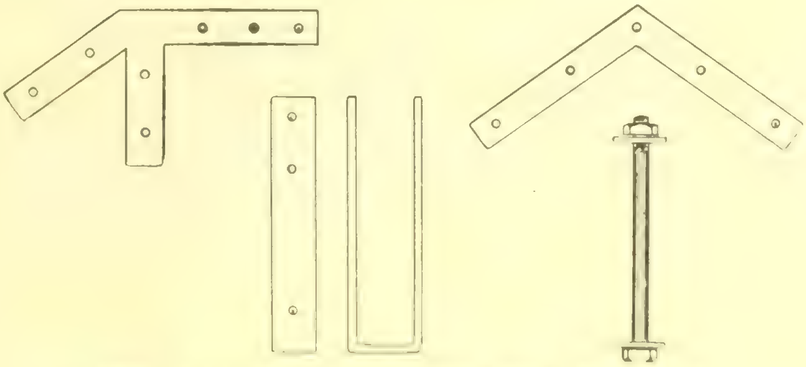
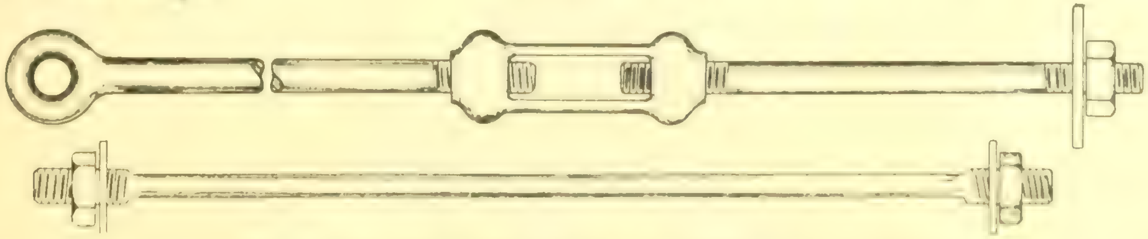


IRON FORGINGS, for Wooden Trusses, Apex Straps,
Stirrups, Bolts and Rods made to order



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BEAMS, ANGLES, CHANNELS, PLATES

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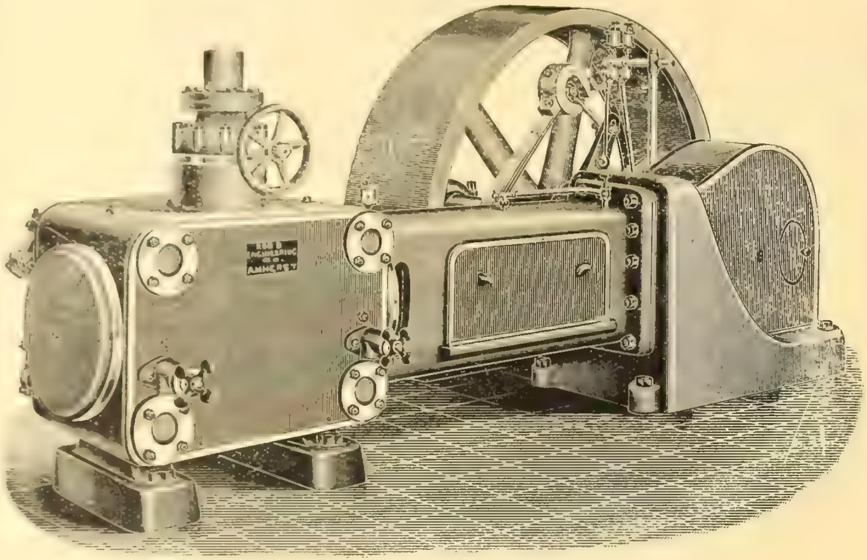

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Horizontal
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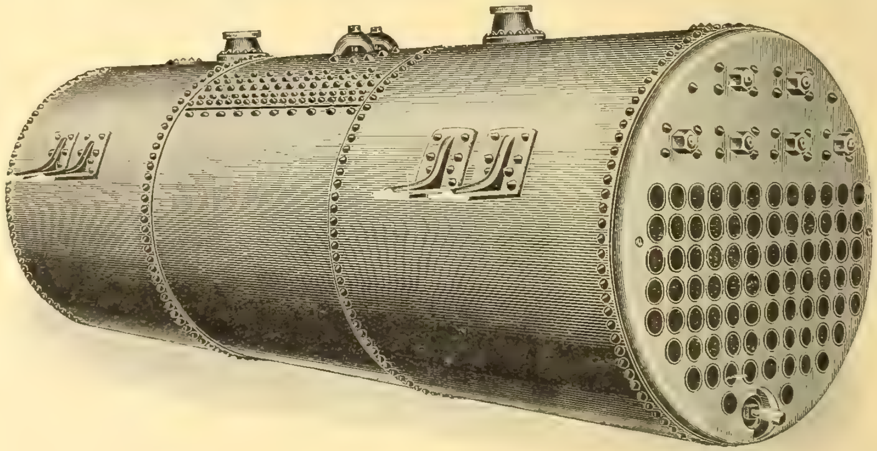

Robb Engineering Co.

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A Distinction with an Ocean of Difference

Offices of the Gurney Northwest Foundry Co., Ordinary Prisms were removed from this and Luxfer Prisms installed.

Copy of Letter from the Gurney Northwest Foundry Co.

The Luxfer Prism Co., Ltd.,
Toronto, Ont.

Gentlemen,—Regarding the **Luxfer Prisms** which you installed in our office. The previous **Prisms** which we had before were practically of no use to us, and we must say that the results obtained by the **Luxfer Prisms** have been everything that you claimed they were, and in place of the office being dingy and having to use electric light nearly all the time, it is now so we can see practically in every part of the office without the use of electric light, unless it is really a dark day outside. We would have hardly believed it were possible to make the difference in the lighting of the that office those **Prisms** have.

Yours truly,
(Signed) GURNEY NORTHWEST FOUNDRY CO.

Do not put little 2 x 4 lighting areas and expect to get large results. When planning good buildings it pays to use good space of LUXFER PRISMS, your clients will appreciate the investment.

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The Luxfer Prism Company, Limited

100 King Street West - - Toronto, Canada

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Sash, Doors, Frames,
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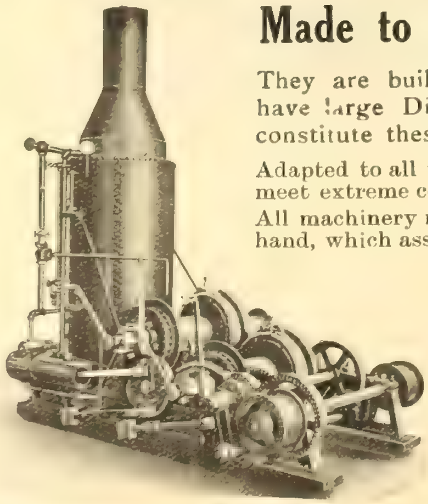
Material to Detail

S. Anglin & Company
Kingston, Ontario

"Buffalo Hoists"



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Made to WORK and LAST while WORKING

They are built strong.—They have plenty Boiler capacity.—They have large Diameter Shafts.—Simplicity, durability, and efficiency constitute these engines.—They are up-to-date.

Adapted to all requirements and Constructed with special attention to meet extreme conditions under which they are subjected

All machinery made to Duplicate Part System. A large stock always on hand, which assures prompt shipment.

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Sanded and Polished
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Dash Cornice

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Let us figure on your contract

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Concrete Floor Dressing prevents abrasion, wear, dust formation, water, oil and grease absorption.

Alkali Proof Sizing prepares interior plastered walls for highest class decorations.

Waterproof Flat Finishes for highest class interior decorations of plaster, metal and Beaver Board surfaces.

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French Cæn Stone Finish, a perfect reproduction of **French Cæn Stone.**

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Transparent Waterproofing waterproofs concrete, brick, stone, granite and marble without changing color or texture.

Liquid Cement waterproofs and uniforms surface color of concrete and stucco. Bonds plaster to concrete.

Liquid Cement Filler fills cracks and breaks in Concrete and stucco surfaces.

Acid-proof Coating and Graphite Acid-proof Coating for iron and steel, submitted to **Extreme Corrosive Conditions.**

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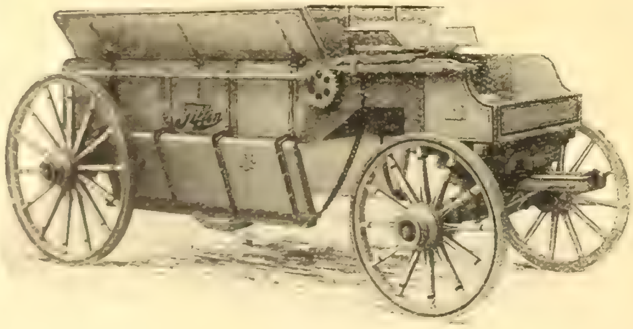

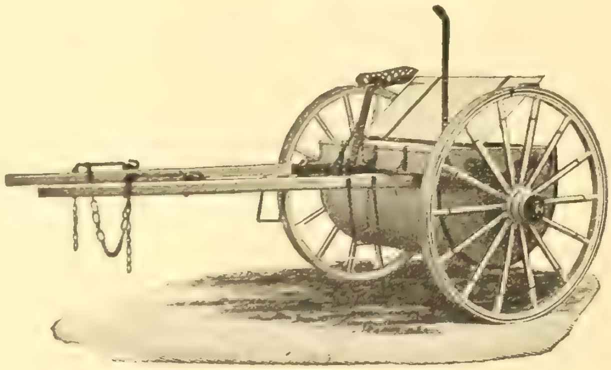

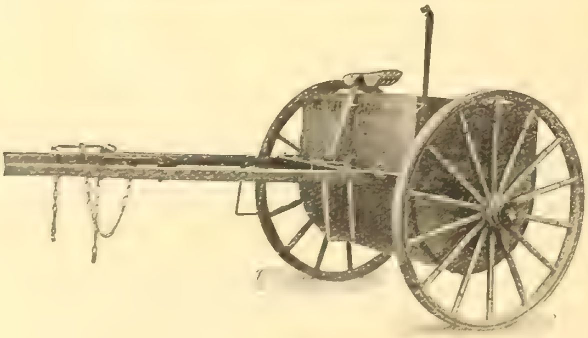

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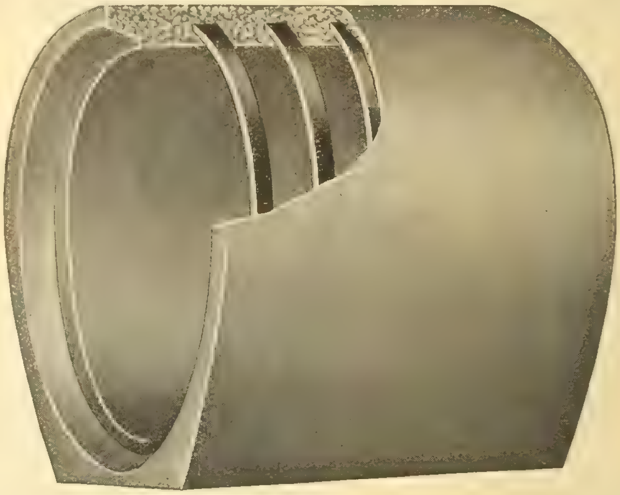

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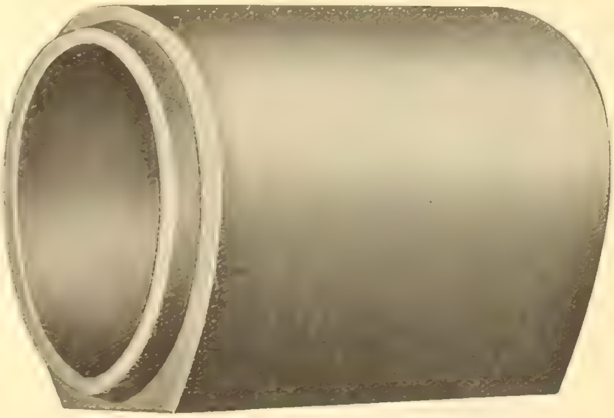

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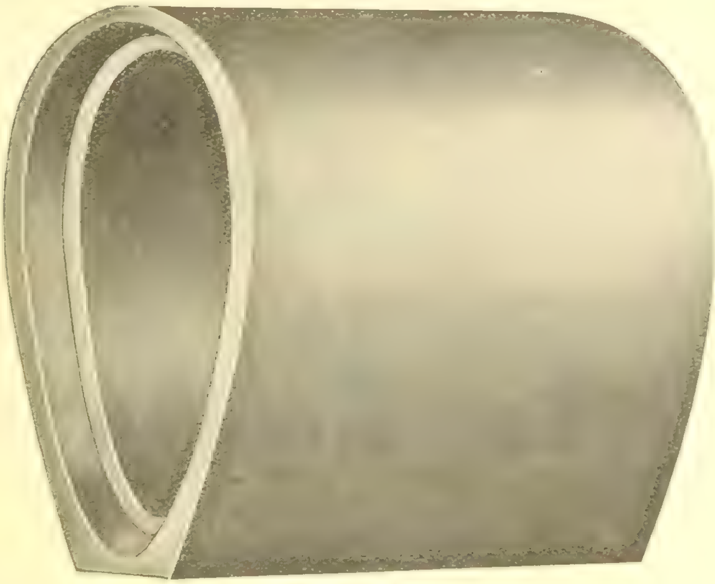
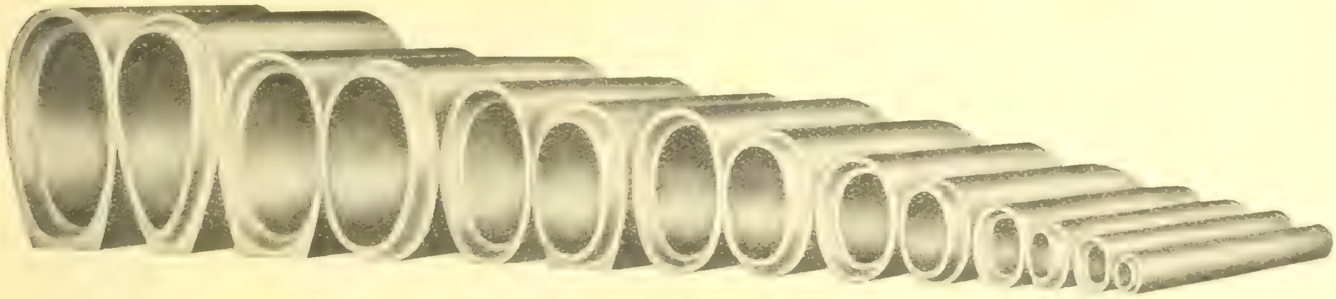
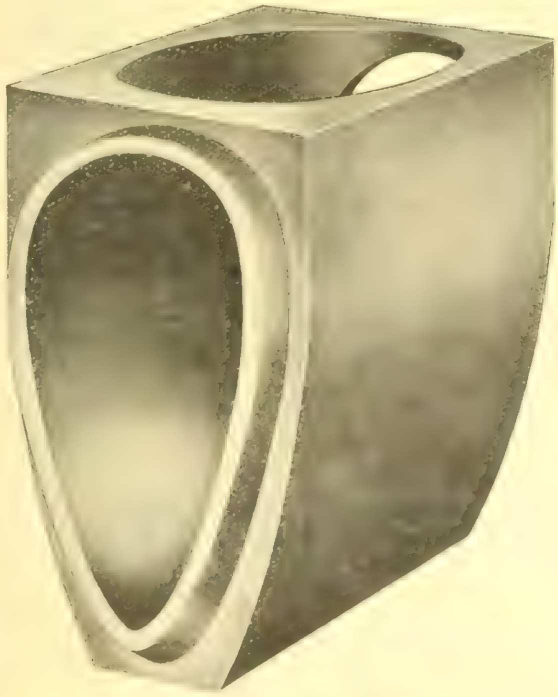


Section of 2' x 3' pipe





Man-hole Section of 2' x 3' pipe

Concrete sewers abound in **England** and **Germany**. The modern **sewers** of **Paris** are all of **concrete**. American cities have adopted it. **Brooklyn** has hundreds of miles of it with not a single failure, whereas even Scotch vitrified pipe has been found to have deplorably failed there. **Toronto,** after much hesitation, is now in line with concrete. Why be the last to join the ranks you eventually will and must join?

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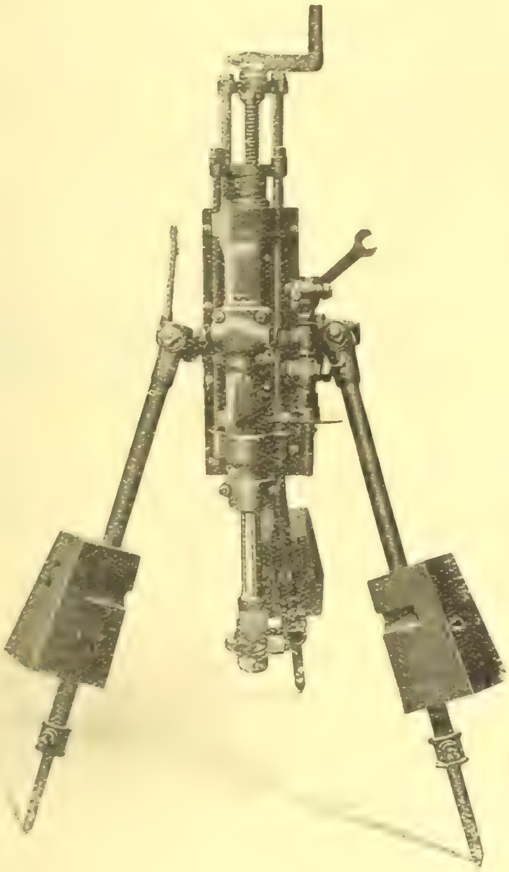

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A DRILL that is made on principles entirely different from those followed in ordinary drill construction—principles that make for longer life and greater drill economy.

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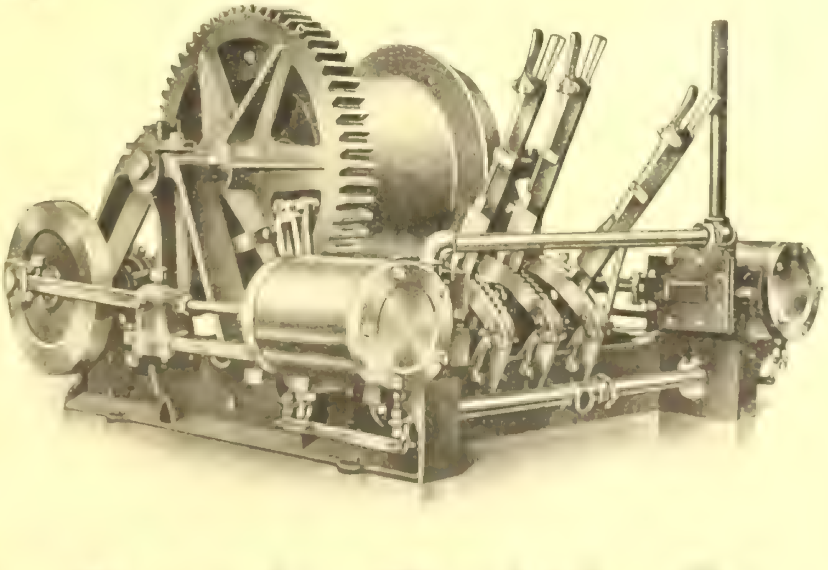

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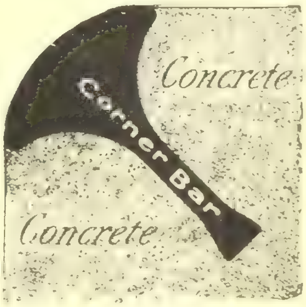

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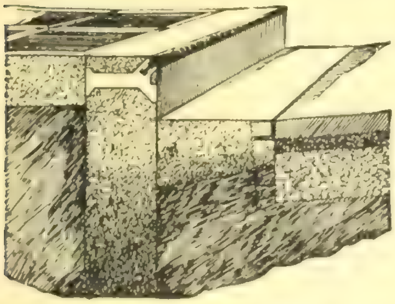

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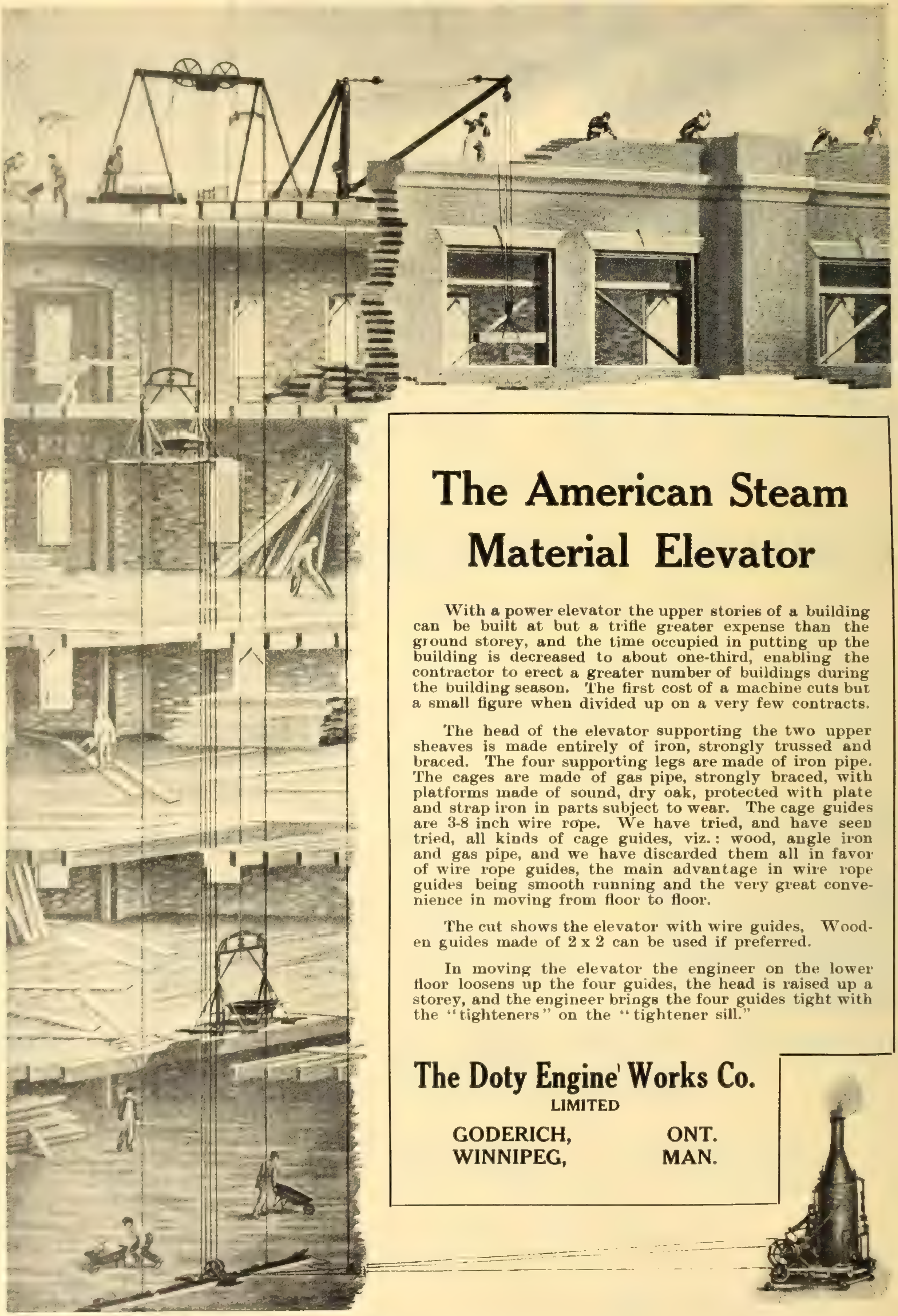

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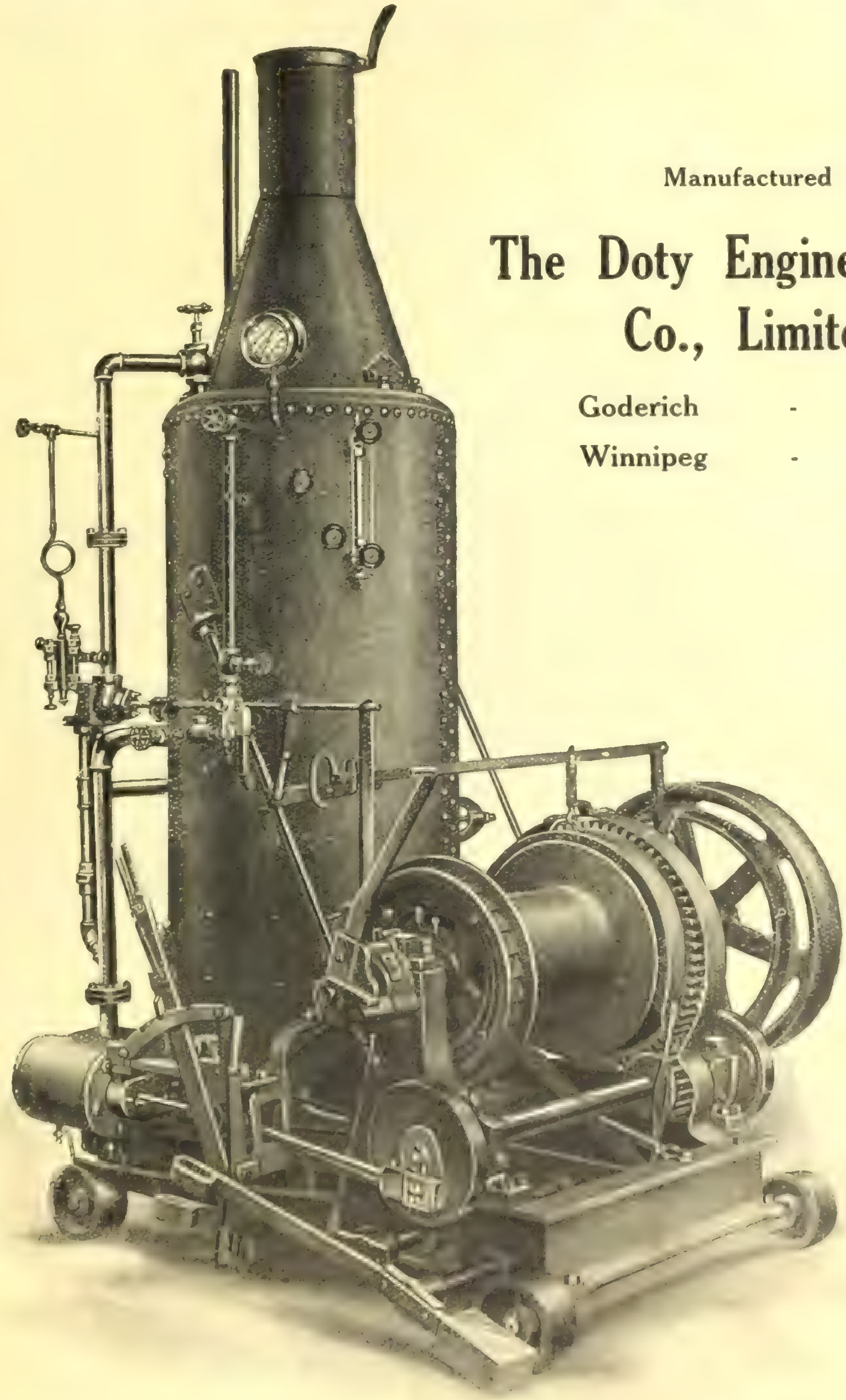

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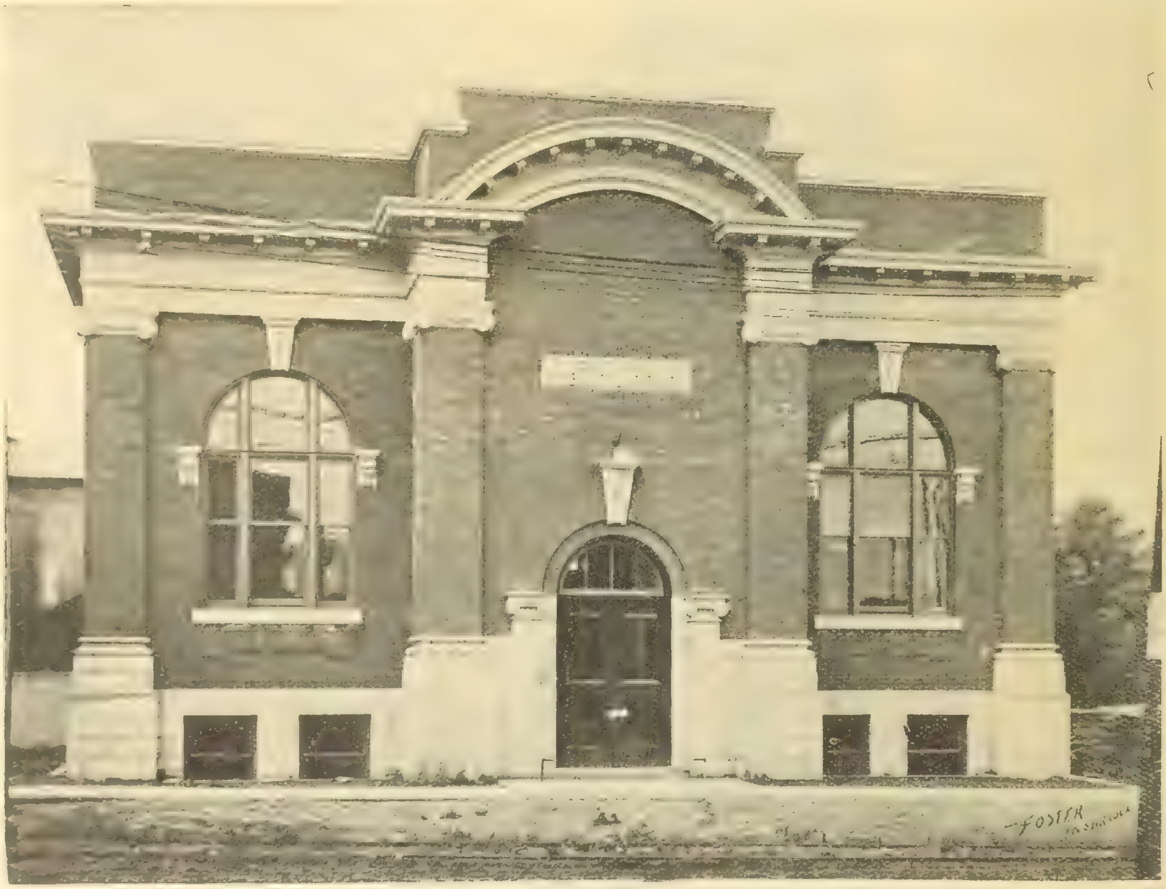

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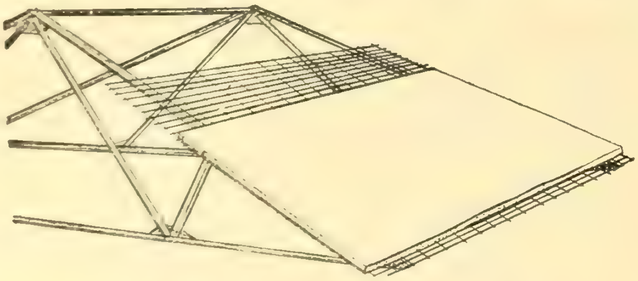

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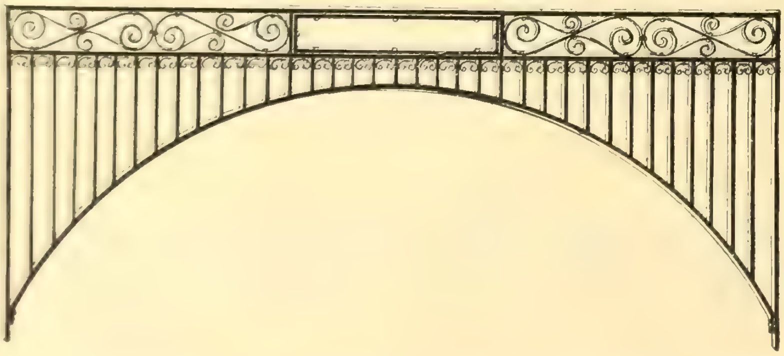

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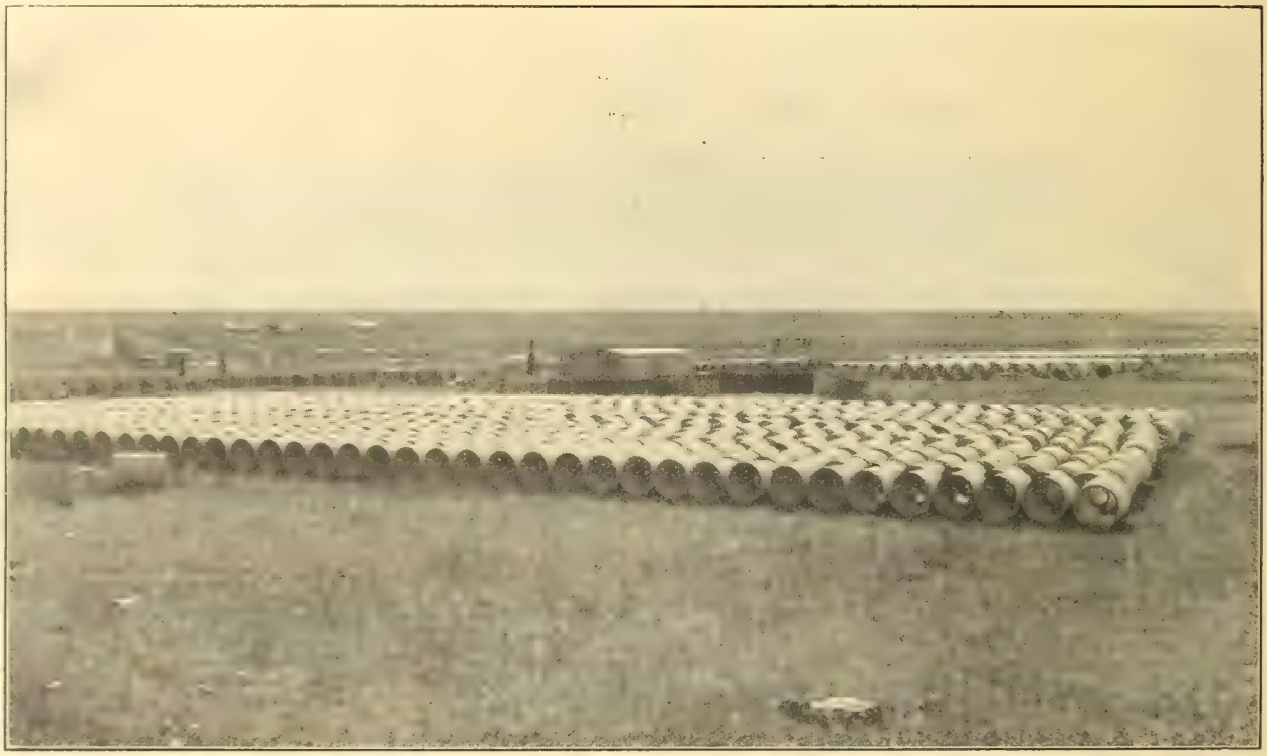

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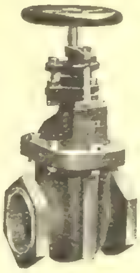

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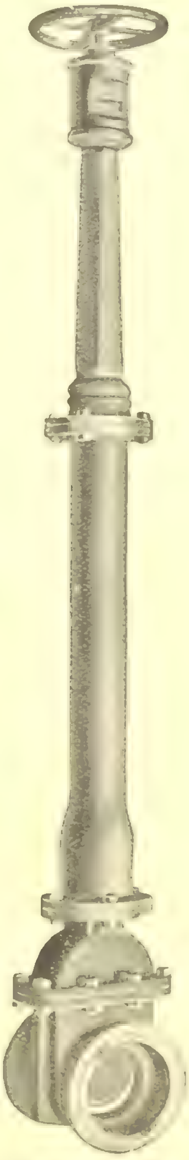

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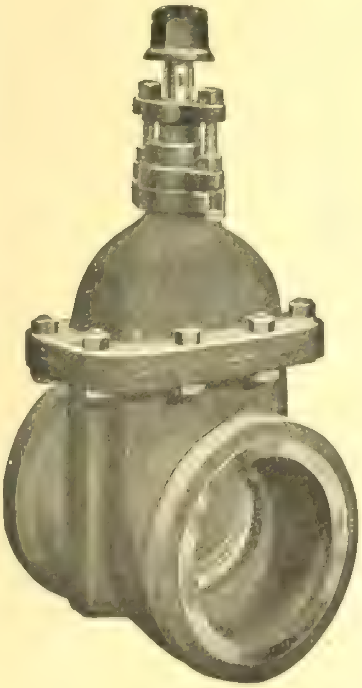

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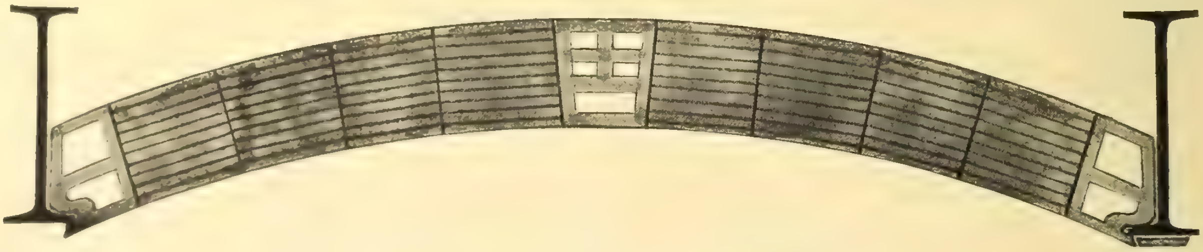

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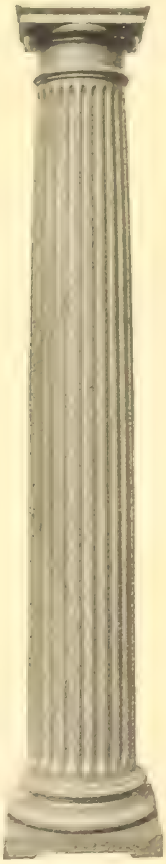
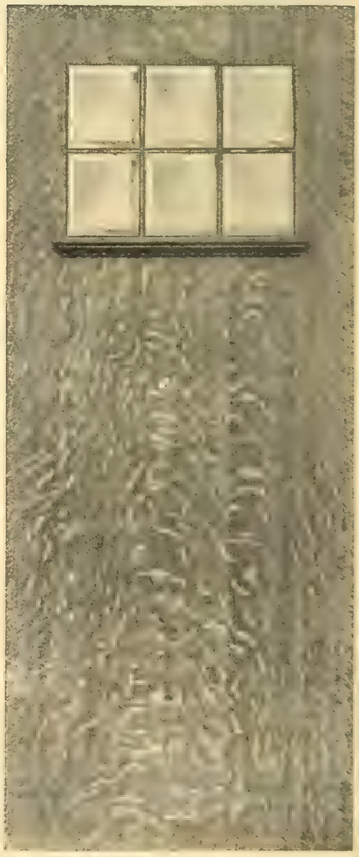


Column Style B. L. No.



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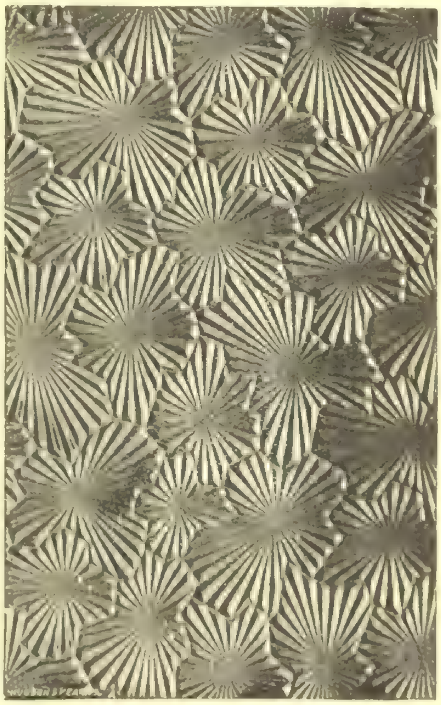

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Facilities	Our mills are thoroughly equipped and have an ample capacity and good storage, which enables us to ship all orders promptly. They are so distributed as to have every advantage of railway and water connection. We are particularly well situated to supply Ontario and Western Canada.
Packages	Every precaution is taken to provide the highest character packages.
Tests	Throughout the entire manufacture of our cement the greatest care is exercised to keep the product at its high standard. The care exercised in this regard has created a reputation for reliability among the users of cement who do not have the time or opportunity to test each shipment, and who consequently rely largely upon the manufacturer.
Adaptability	Our cement is adapted for all purposes where high grade cement is desired, such as in foundations for buildings and heavy machinery, tunnel work, cisterns, cellar floors, sidewalks, pavements, curbing, artificial stone, conduits, sewers, reservoirs, bridge piers and concrete work of all kinds.
Information	Architects and Engineers will be assisted with any information desired and we will co-operate in making any tests of our cement on request.

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Limited
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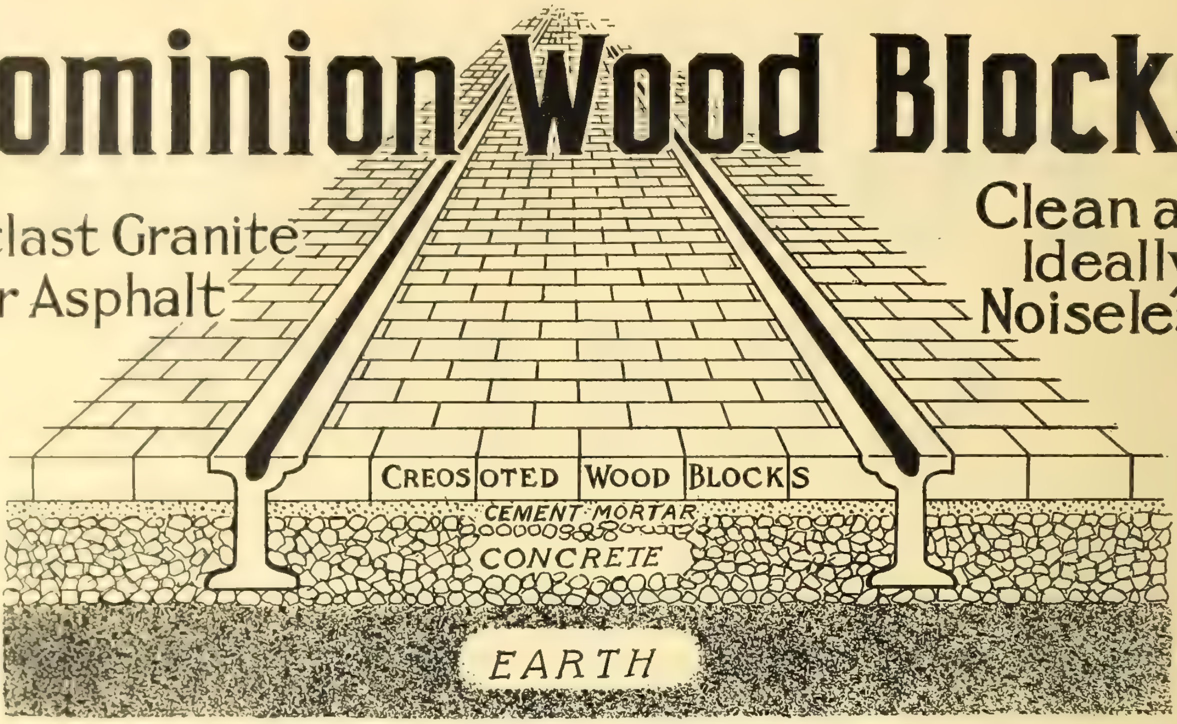

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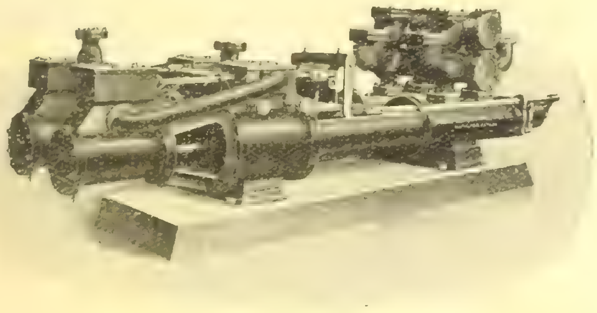

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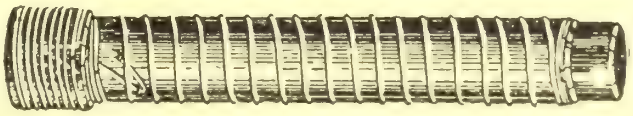

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Direct or Belt Driven

Manufactured for use throughout the Dominion of Canada by

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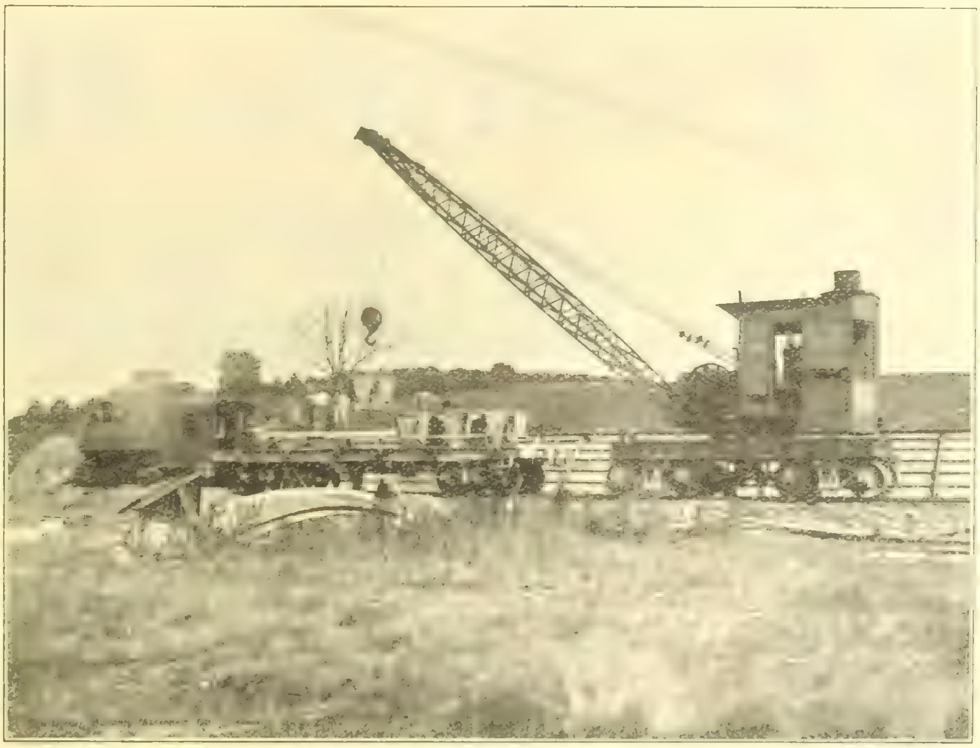

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an indispensable tool, because they are adapted to so many uses: for excavating—for unloading from cars, whether loose material such as broken stone, concrete, sand or coal; or heavy materials such as rails or machinery; or can be used for switching cars.

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Largest Canadian manufacturers standard and special

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for every service.

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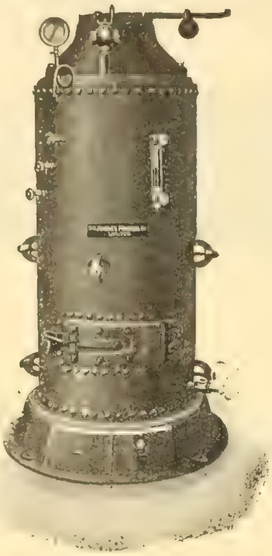

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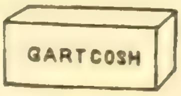

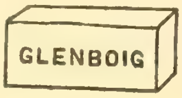

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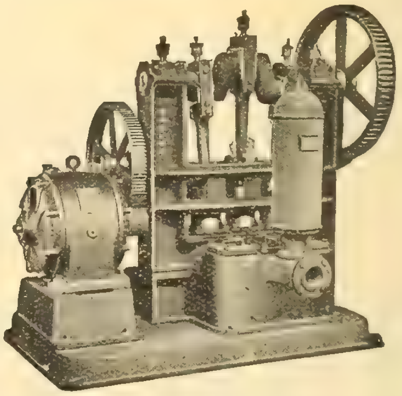

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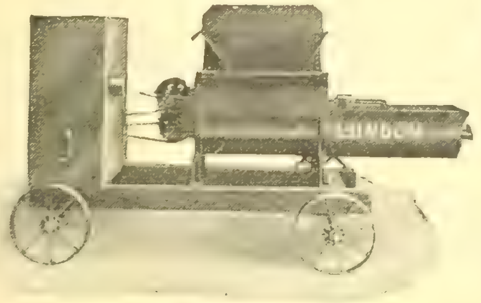


London Automatic Batch Mixer No. 1

London Concrete Mixers

are made in all styles and sizes, meeting every requirement. **CONTRACTOR,** WE DO NOT DICTATE TO YOU AS TO WHAT STYLE OF MACHINE YOU SHOULD PURCHASE, we have EVERY STYLE AND SIZE of mixer required.

THE LONDON AUTOMATIC BATCH MIXER No. 1, with 2½ H.P. Gasoline Engine has a capacity of 50 yards per day, weighs only 1,600 lbs., is easily moved from place to place, can be set to give any desired capacity up to 50 yards, will measure any materials automatically, will give any consistency of moisture. This machine has the largest sale of any mixer manufactured or sold in Canada.

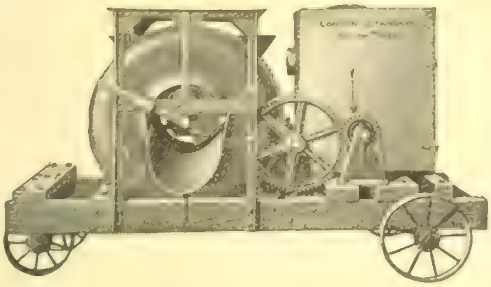
THE LONDON AUTOMATIC BATCH MIXER No. 2 has a capacity of 75 yards per day with two hoppers and 150 yards per day with three hoppers. Price, with three hoppers, **$405.** This machine AUTOMATICALLY MEASURES and PROPORTIONS any three materials and has the same features as the London No. 1.

These machines will be shipped anywhere on approval. WHY PAY A LARGE PRICE FOR CONCRETE MIXER WHEN YOU CAN PURCHASE AN AUTOMATIC MACHINE AT A MODERATE PRICE?

The London Automatic Machines will save you money—
- Cost of Producing Concrete.
- In the First Cost of Mixer.
- Cost of Maintenance.

London Automatic Batch Mixer No. 2

London Standard Batch Mixers



London Standard Drum Batch Mixer No. 1
Equipped with Gasoline Engine

THE LONDON STANDARD DRUM BATCH MIXERS are made in four sizes, namely, one-third yard, one-half yard and one yard batches, and are furnished with any equipment.

THE MANY NEW AND IMPROVED FEATURES of the London Standard Drum Batch Mixers appeal to every contractor desiring a mixer of this type. WE CAN GIVE YOU THE BEST VALUE FOR YOUR MONEY of any firm doing business, BECAUSE we manufacture only Concrete Machinery, and on this account we can sell you a machine at very much less cost than firms who do not manufacture their own machines but handle a concrete mixer along with other lines of goods.

We also Manufacture

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CEMENT BRICK MACHINES
POWER CEMENT DRAIN TILE MACHINES
HAND CEMENT DRAIN TILE MACHINES
SEWER PIPE MOLDS
ORNAMENTAL MOLDS SILO CURBS
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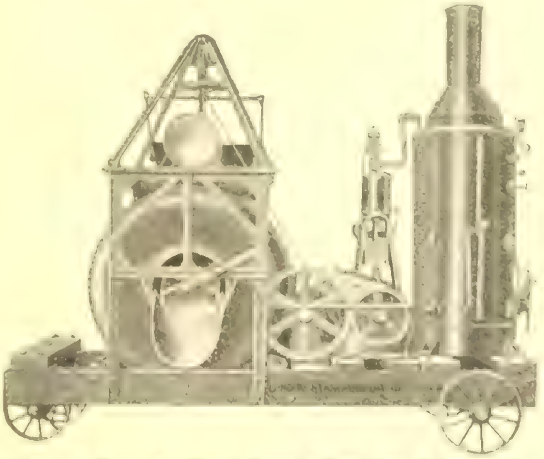
And a full line of CEMENT WORKING TOOLS

We are the largest manufacturers of Concrete Machinery in Canada, and can meet every requirement of the Contractor in the line of Concrete Machinery at the lowest possible cost. Tell us your requirements.



London Standard Drum Batch Mixer No. [illegible] equipped
with Steam Engine and Loading Skip

London Concrete Machinery, Company

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19 Marmora Street, London, Canada

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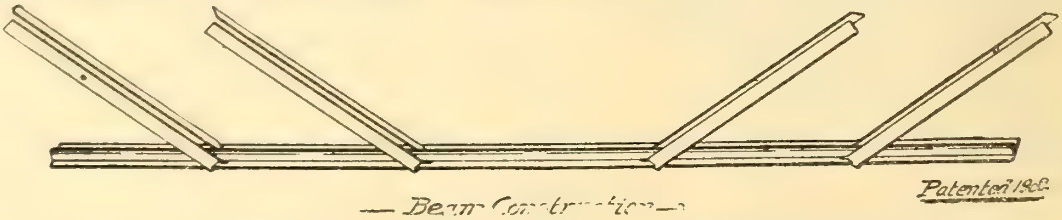

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We desire to get in touch with Contractors or Engineers as partners to handle the Canadian output. We invite co respondence.

Interstate Engineering Contracting Co., 1120 Majestic Bldg., DETROIT, MICH.

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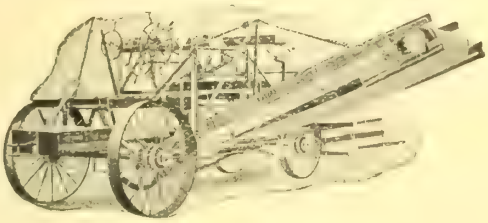

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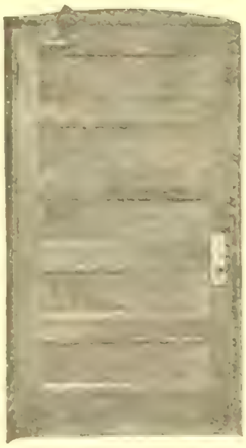

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in Red, Brown, Green, Stlate

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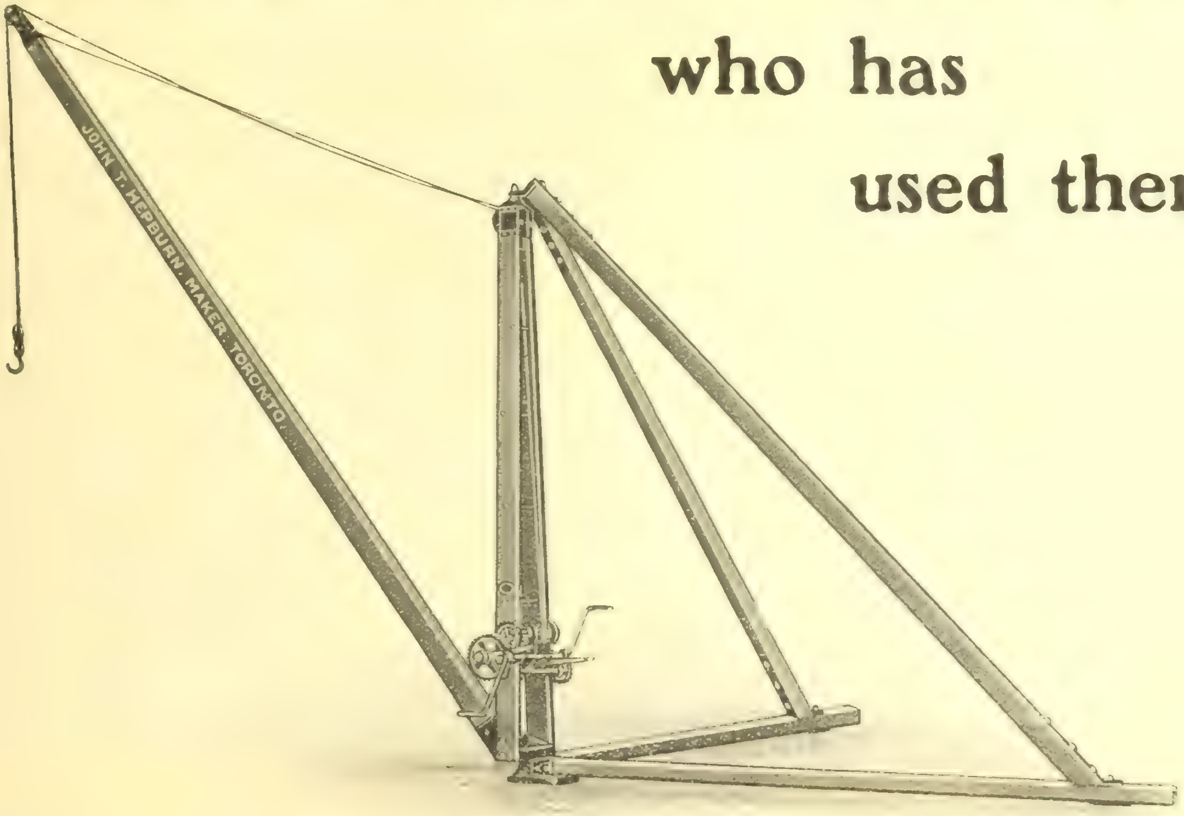
who has used them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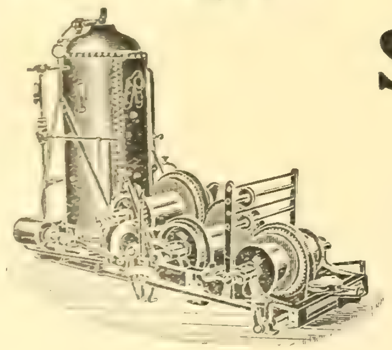

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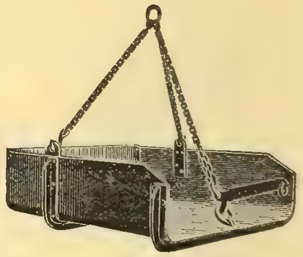

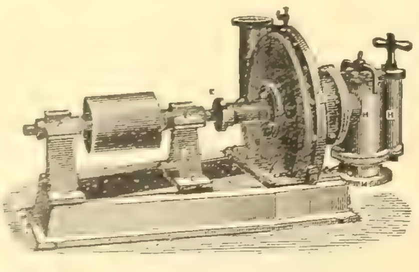

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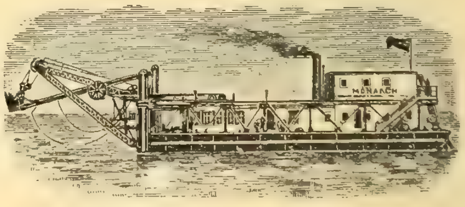

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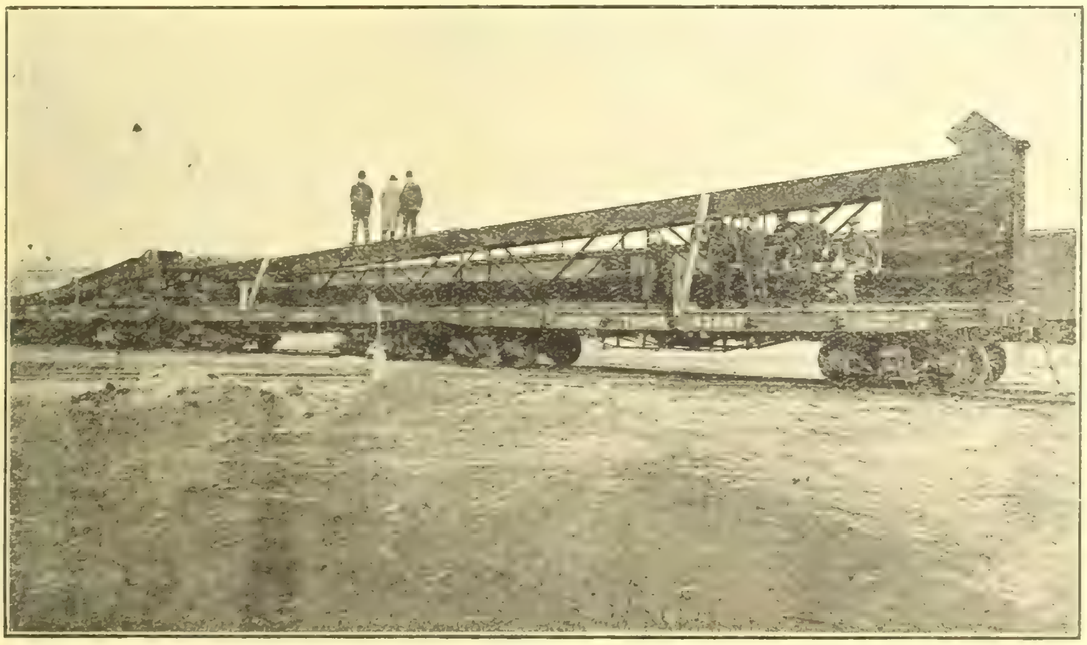

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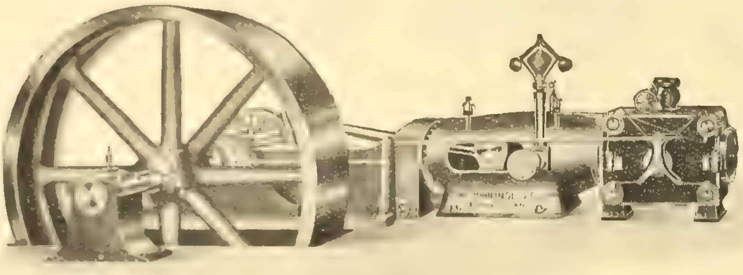

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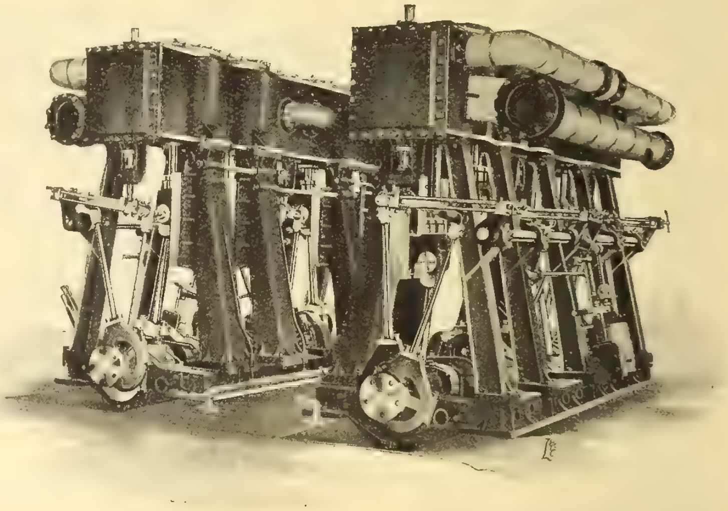

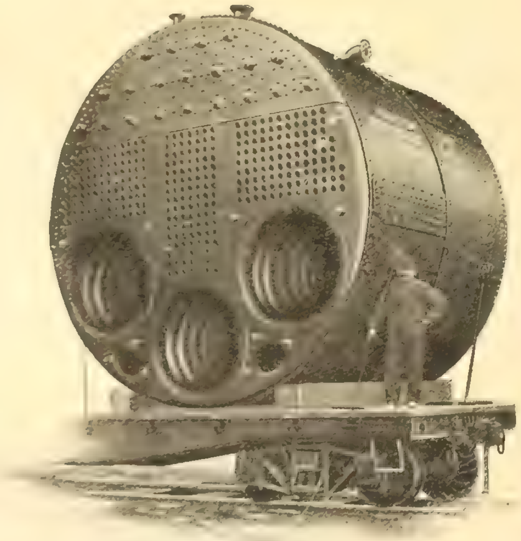

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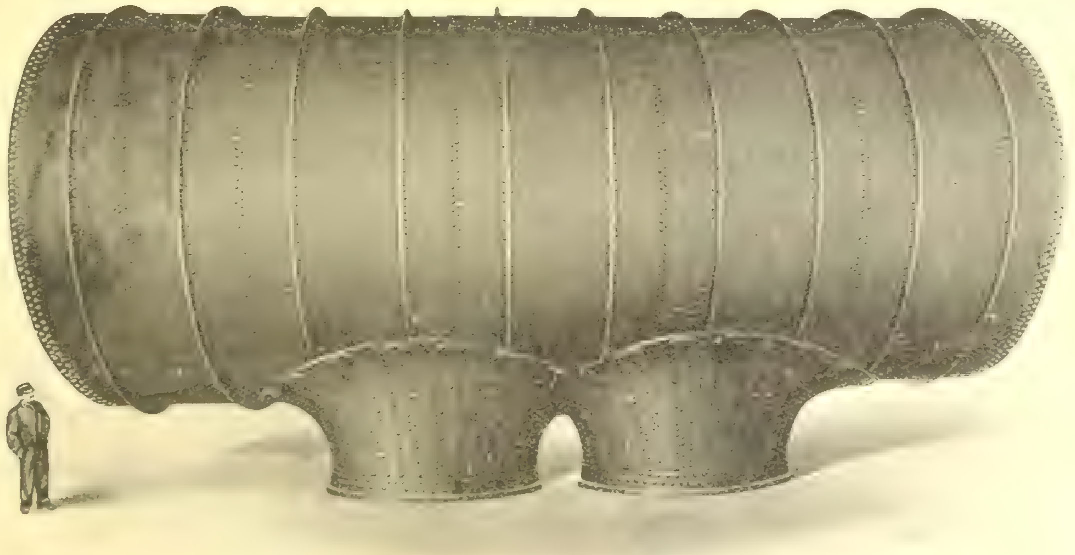

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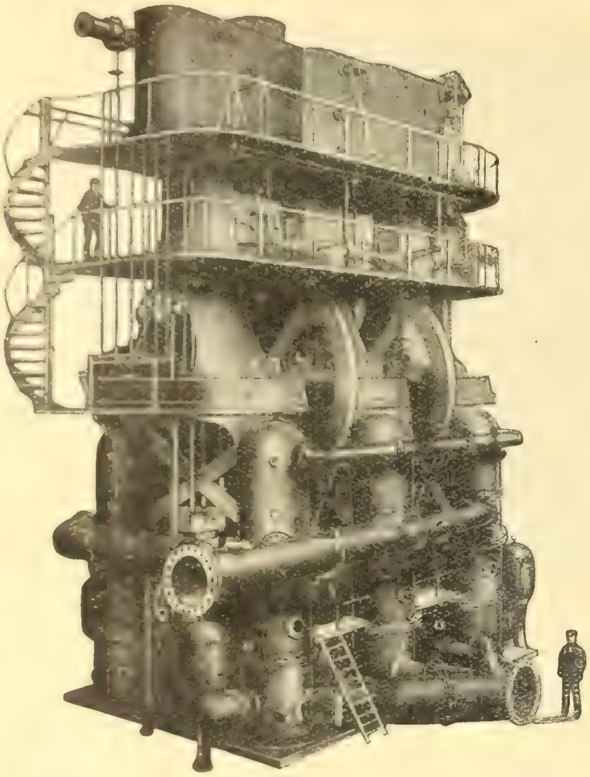

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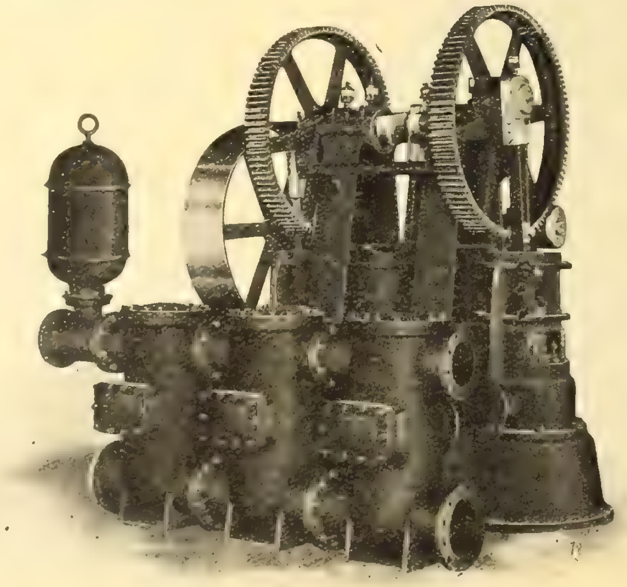

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ESTABLISHED 1886

Contract Record

A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

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Introducing a Record Season

In presenting to the engineering and contracting interests our Special Annual Number, we have every reason to believe that they will receive it in that spirit of co-operation and good-will which has contributed so materially to the advancement of this journal in recent years. Coming as it does at the opening of a season that gives every promise of record activity, its pages will doubtless be perused with more than ordinary interest.

In the preparation of this number we have endeavored to select those articles that are not only interesting in point of design but suggestive in practice. Thus, several recent departures in construction are noted at some length. We trust that our readers will not hesitate to afford us the opportunity of providing them with further information should they find any portion of our remarks insufficient.

A word at this juncture concerning the "Contract Record" may be permissible. It is our aim to publish a paper that shall be really helpful to the progressive men whom it serves; that shall protect the position of the engineer and fortify the interests of the contractor, at the same time bringing the one to a better understanding of the other, and striving at all times to promote healthy and honorable competition. In the past we have commented from time to time on unsatisfactory contracting conditions, on the prejudices and favors of local authorities, and other topics of editorial interest. That such comments have engaged the serious attention of our readers is evidenced by the discussions that have been carried on in these columns; and we shall continue this policy, believing that the success of this community as a whole depends upon a fair field that is always open to honest investigation. So much for the editorial conduct of the paper. For the rest, we hope to sustain the interest of the reader in making the paper more truly representative of the best modern construction; by publishing plans and working details whenever procurable; by expert articles and criticisms, and by developing the journal as a live news organ.

We have alluded to the prospects of the coming season as giving promise of record activity. We were always optimistic, for we regard pessimism as a disease rather than as a state of the mind, but in this case there are evidences to hand which amply support our prediction. With reports coming in from various sections of the country showing material increases over the corresponding periods of 1910, which was an exceptionally good year, and with satisfactory conditions in the supply and labor markets, there is no reason for doubt. One might urge the perennial complaint of the probably serious shortage of labor in Western Canada. This will loom up at the opening of many seasons yet to come. The problem of finding sufficient labor for the country's development will be long in its solution, for at present prospective work in Canada increases in a far greater ratio than immigration.

We take this opportunity of thanking our many advertisers for their generous support.

The Cement Show and Convention

The Canadian Cement and Concrete Association is broadening out in a manner that cannot fail to be of great benefit to building and allied interests in Canada. No effort has been spared to make a success of the convention and exhibition now being held at Toronto, and the widespread co-operation that has been put forth in this work must result in giving the industry a tremendous impetus. Both the time and the place are particularly opportune for such an event, and this meeting will mark a tremendous advance over previous undertakings of a like nature in this country. The value of such an exhibition as an educational factor cannot be gainsaid and no one can doubt the advantage of providing the means for this work. The concrete industry, of all lines of endeavor, is undergoing continuous improvement, and no engineer, architect or contractor can afford to neglect the opportunity for obtaining a critical insight into the developments that are taking place. The "Cement Show" affords practically the only opportunity for a study of the progress of the industry as shown by models and machinery. There is another strong point in favor of the exhibition, viz., that it awakens a general interest on the part of the public, which, while naturally relying upon professional advice for technical application, always welcomes the chance for individual investigation.

The recent action of the Ottawa city council in calling for tenders for castiron pipe, and in turning down the lowest bid because it happened to come from a British firm, will certainly not improve the reputation of the federal capital in contracting circles. The excuse made was that there would be delay in procuring the pipe from Great Britain. If this is such an overwhelming obstacle, and if the Ottawa council is so expeditious in proceeding with its municipal undertakings, why put these British firms to the trouble and expense of tendering? Why not insert in the notice for tenders a statement that only Canadian bids will be entertained?

The action of the Ottawa city council does not commend itself to us. It is work of this kind that helps to make the Britisher think lightly of the Canadian market. Business is business, and local sentiment should not influence it. Ottawa may not want British business or British competition, but all is not good that emanates from Ottawa and its example in this case constitutes a poor precedent

General View of Site Pile Driver Starting on Coffer Dam

Dry Dock Construction at Port Arthur, Ont.

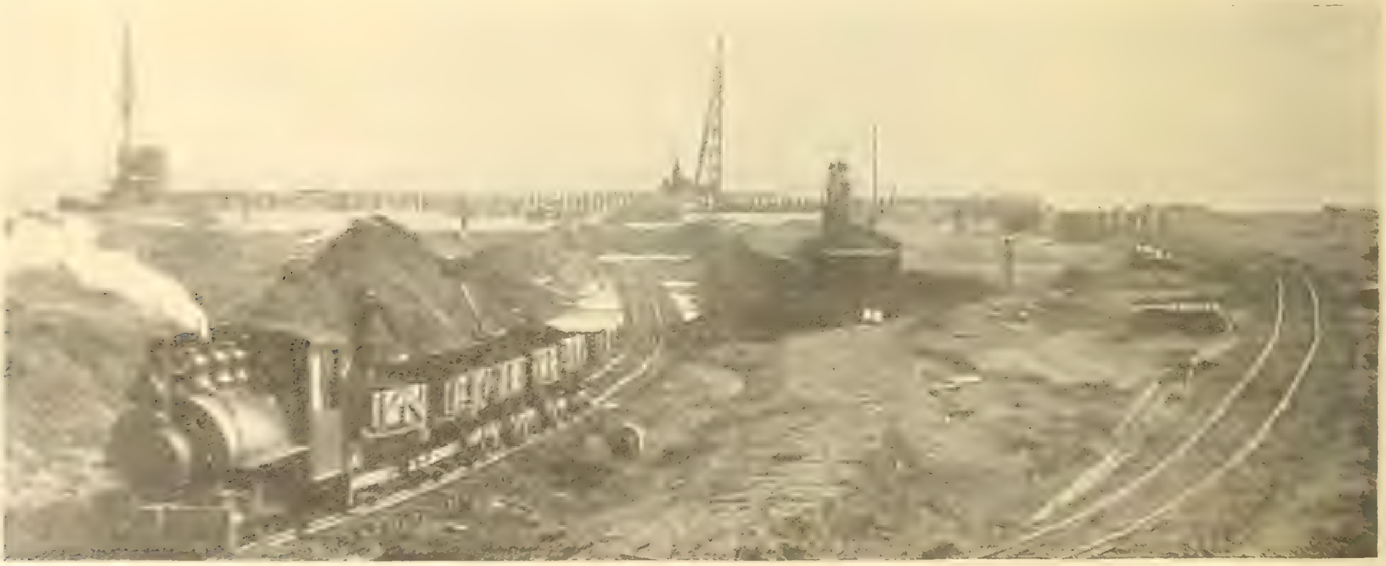
Detailed Description of Interesting Work Completed by the Canadian Stewart Company, Limited—A Resourceful and Expeditious Contract

Great Lake shipping on the Canadian side has long been hampered by the lack of dry dock accommodation at the head of Lake Superior. This condition, with the opening of the new dry dock just completed for the Western Dry Dock & Shipbuilding Company will cease to exist and an impetus will be given to the building of vessels and to its allied industries. The new dock is capable of holding the largest vessels on the lakes, it being 700 feet long and having a clear span at the portal of 77 feet 6 inches, with 21 feet of water from the sills. It is unique in that it is constructed throughout of concrete and steel and rests upon a rock foundation.

The Western Dry Dock & Shipbuilding Company, of which James Whalen is president, is in affiliation with the American Shipbuilding Company, who have large docks at Buffalo, Cleveland, Lorain and Superior. This association is evidence that no expense has been spared in making the new dock one of the best of its kind, and the fact that the Canadian Stewart Company, Limited, were the contractors who constructed the plant, is an assurance that the workmanship is of a high order. Mr. A. V. Powell, of Chicago, prepared the plans and specifications. Ultimately a complete shipbuilding plant will be operated, the work completed at the present time consisting of the dry dock and two building berths, a large steel punch shop and machine shop.

In connection with the dry dock a large amount of excavation was necessary, 90,000 cubic yards of earth and rock being removed. A 70-ton Marion shovel, with a 2½ yard dipper fitted with Panama teeth, was used. Digging began at the shore end in April, 1910, and trains and dump cars hauled by locomotives transported the excavated material to form an earth fill on either side, making new ground beyond the original shore line. To completely cut off the water during construction a cofferdam 900 feet long was built in the shape of a horseshoe surrounding the site on three sides.

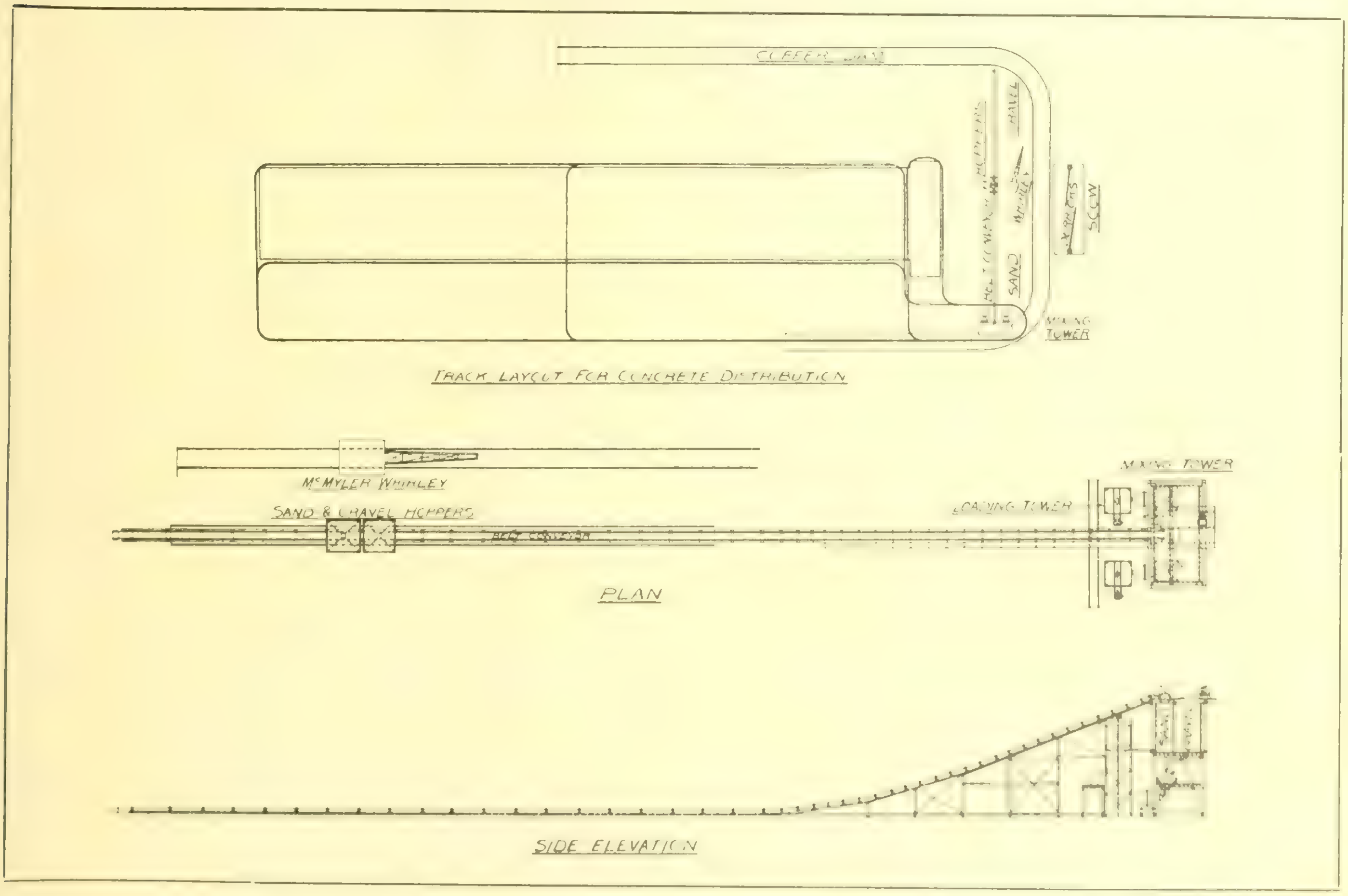
Two pile drivers were employed and these working in opposite directions from the portal end drove round piles in two parallel rows, 900 ft. long, forming an enclosure around the portal end 300 ft. wide. These piles, spaced 3 foot centres, formed an outer and inner fence for the 6 in. x 10 in. and 2 in. x 10 in. sheet piling which was afterwards driven to rock. Waling strips, 8 x 12 inches, were used for the sheet piling and round pile wales were used for the outside. Steel tie rods were placed across the cofferdam every three feet. On top of the round piling and sheet piling a framing was constructed of 8 in. x 12 in. timbers on



Coffer Dam in Course of Construction—Excavating Commenced which a temporary dinkey track was laid. As fast as the sheet piling was driven, earth filling was carried out by means of trains of dump cars operated by dinkey engines. The resulting cofferdam was a very stable structure. To pump out and keep dry the dock excavation, and the enclosure formed by the cofferdam, two Emmerson Junior pumps and one No. 2 Emmerson pump were installed.

The cofferdam completed, excavation was carried to rock throughout, enough shale and igneous rock being removed to level the basin. Six Canadian Rand drills and one Kelly and Tanneheld 5-inch well boring machine comprised the drilling outfit.

The speed with which the concrete work was done was due to the organization of the working forces and the efficient arrangement of the plant. Placing concrete was so simplified that from the dredging to the final pouring the work was continuous. Scows of 1,000 yards capacity, fitted with derricks and clam shells, dredged sand and gravel from Lake Superior, sixty miles from the vicinity of the work, and unloaded it at the portal face upon the cofferdam on either side of a travelling McMyler whirley; two hoppers placed over a 24-inch conveyor belt, electrically driven, received the materials from the whirley and alternately fed the belt which led to the mixer tower. Here were two receiving hoppers for sand and gravel and below were two charging hoppers. These received the proper quantities of sand, gravel and cement for separate batches of concrete, and the whole was run into one of the two mixers below. A new charge was immediately prepared and this in turn run into the second mixer. In this way it was possible to have the plant working to its full capacity without intermission. The concrete after being mixed was elevated to cars above by a Ransome bucket hoist. These cars, "V" shaped, of one yard capacity, ran along the top of the dock wall forms and the concrete was poured directly into the forms. The tracks being laid in a number of loops crossing the dock excavation on trestles, no confusion was possible in returning cars to the mixers. By this system as much as 1,000 yards of concrete was placed by two shifts in one 24-hour day.



TRACK LAYOUT FOR CONCRETE DISTRIBUTION

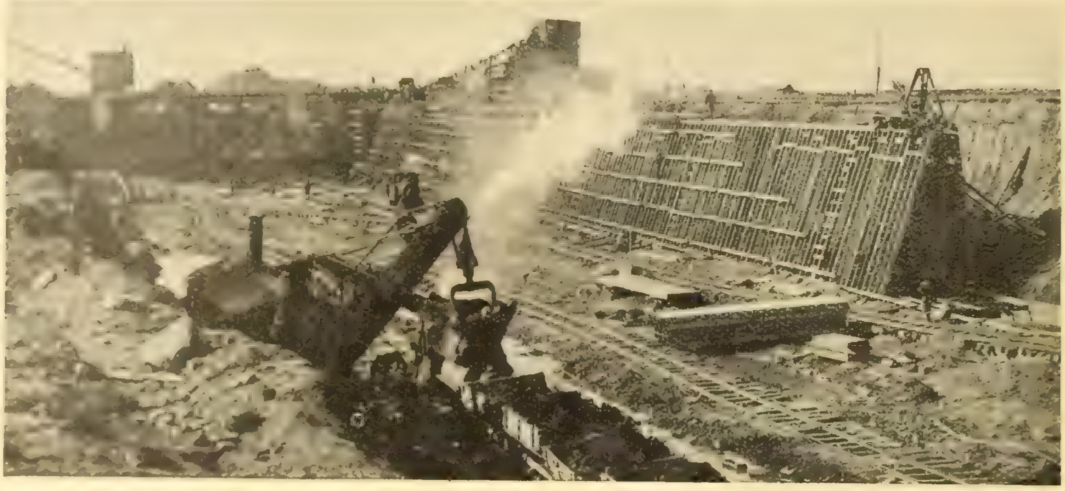
PLAN

SIDE ELEVATION

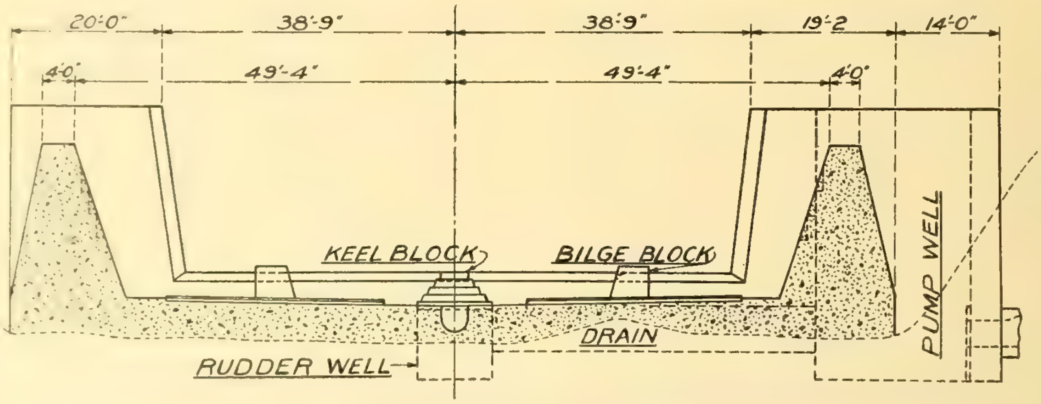
The forms for the side walls were made in small sections for convenience in handling. Each section was five feet wide and extended the full height of the wall. Seven of these were placed together and bulkheads were attached at each end. In this way a section of the wall 36 feet long could be poured, making a huge monolithic block. Alternate 36-foot lengths were first built, and when the concrete had finally set the intermediate sections were poured. An expansion joint was formed for every 36 feet of length, and cracking was obviated.

The dock proper is 85 feet 4 inches wide at the floor level and 98 feet 8 inches at the top of the walls. It is 700 feet long, and a further length of 28 feet 6 inches with the portal may be utilized. Spaced every 18 feet in the side walls are three altar steps designed to hold lateral bracing when a vessel is in the dock.

The floor is of solid concrete from two to four feet thick, sloping towards a central drain which terminates in a rudder well at the portal end. From the rudder well, a drain protected by an iron grating gives access to the pumping well situated in the west portal pier. With a view to future extension this drain was duplicated on the opposite side of the pumping well so that when a second dry dock is built parallel the present basin, one pumping outfit will serve for both.



Construction Work at Site of Dock

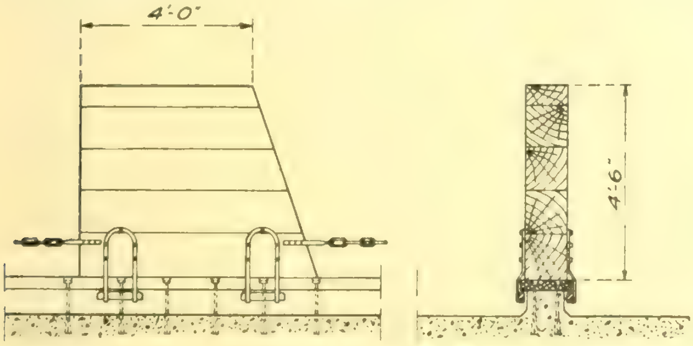


Cross Section Through Dock

Conveyor System for Removing Excavated Material

The portal walls are solid masses of concrete faced with concrete of a 1-3-5 mixture, which is also used in the side walls. The outside corners are curved and protected from injury by steel plates firmly attached by means of steel angle anchors imbedded in the concrete. The portal jambs and sills are faced with steel. Angles, 6 x 6 x ¾ inches, firmly fastened to the concrete floor by 3 x 3 x ½ inch angles, four feet long, spaced every two feet, form a connection for the 16 x ¾ inch plate against which a heavy steel gate rests. Strong lateral anchors embedded in the portal piers hold the jambs in position. Great care was exercised in placing this steel framework to obtain a truly vertical and longitudinal alignment.

A feature of interest is the construction and arrangement of the bilge and keel blocks with their attachments. The slides upon which the bilge blocks move, spaced twelve feet apart on each side of the dock, are made of 3 x 14 inch white oak timbers bolted every two feet. Split anchor bolts, ¾ x 18 inches, fasten them securely to a concrete base and the nuts are countersunk leaving a smooth upper surface on which the bilge blocks slide. These are 4 feet 6 inches in height of 12 x 12 inch Oregon fir timbers. They are drift bolted together at the ends and are furnished with slide irons and wooden slide blocks clamping them to the slides.



Bilge Blocks

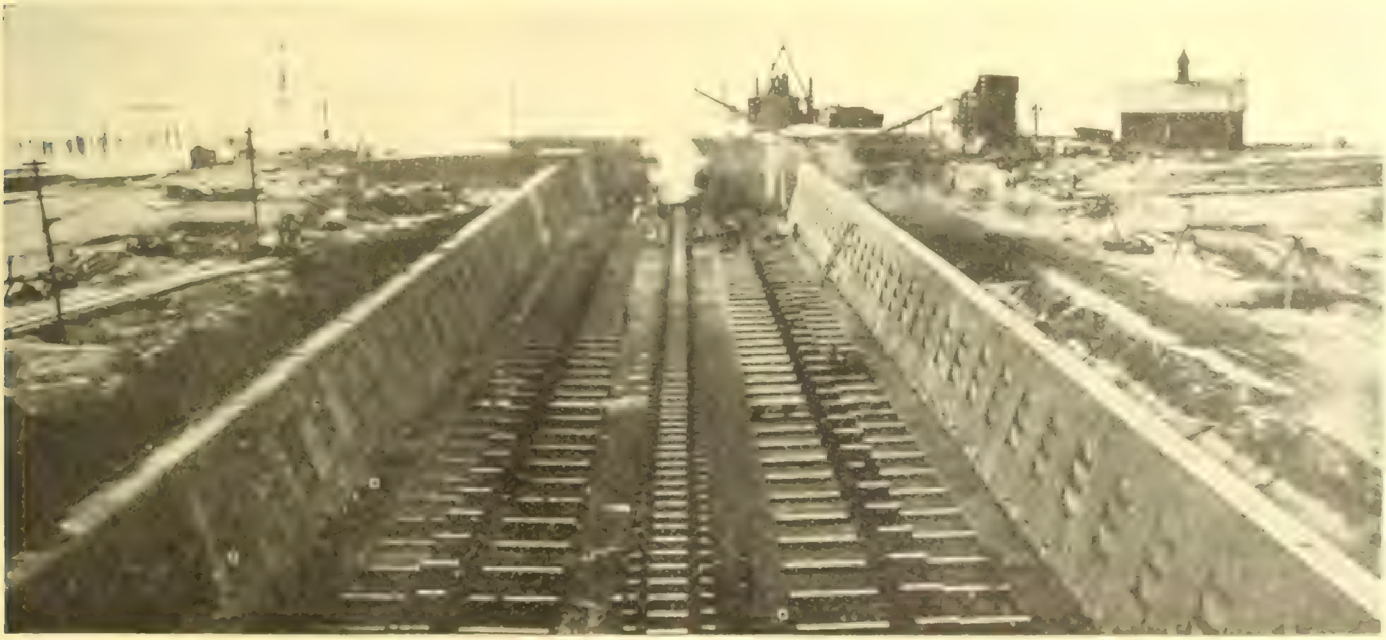
Two hauling chains are attached to each block by means of "U" bolts and two fair leaders are attached to the dock wall, one at the lower angle and the other near the top. The keel blocks, constructed of 12 x 12 in. white oak timbers, bolted together with 1 x 20 in. lag screws, rest on a 12 x 14-inch white oak timber set in the concrete floor and fastened thereto with 24-inch expansion bolts. These are spaced 6 feet apart and extend from the rudder well to within twelve feet of the shore end of the dock.

Method of Handling Concrete for Dock Bottom

Five-foot concrete sidewalks run the full length at each side and four reinforced concrete stairways lead from their ends to the top of the dock walls.

The dock was begun in April, 1910, and completed by the end of November of the same year. The work was carried out under the direction of Wm. R. Sinks, manager, and R. H. Folwell, engineer for the Canadian Stewart Company, Limited.

In the competition for the plans for the new $100,000 stock pavilion at Edmonton, instituted by the exhibition directors of that city, Mr. R. W. Lines was awarded the first prize of $350. Mr. H. A. Magoon the second, of $250, and Mr. Henderson the third, of $200. The cost of the buliding as estimated by Mr. Lines is $108,000. Construction will proceed at an early date.



Dock Basin Completed

Design of the N. T. R. Shops Near Winnipeg

With Particular Reference to the Steel Work — The Locomotive and Erecting Shop, and Other Structures—Heavy Type of Columns Used

Specially Contributed by Hugh A. Mackay, Chief Engineer Manitoba Bridge and Iron Works, Ltd.

There has just been completed at Transcona, about six miles east of Winnipeg, the shops for the National Transcontinental Railway, and a short description of the main features of these shops, with particular reference to the steel work, will doubtless be of interest. There are several features in regard to it which are out of the ordinary style of mill building, more particularly the columns.

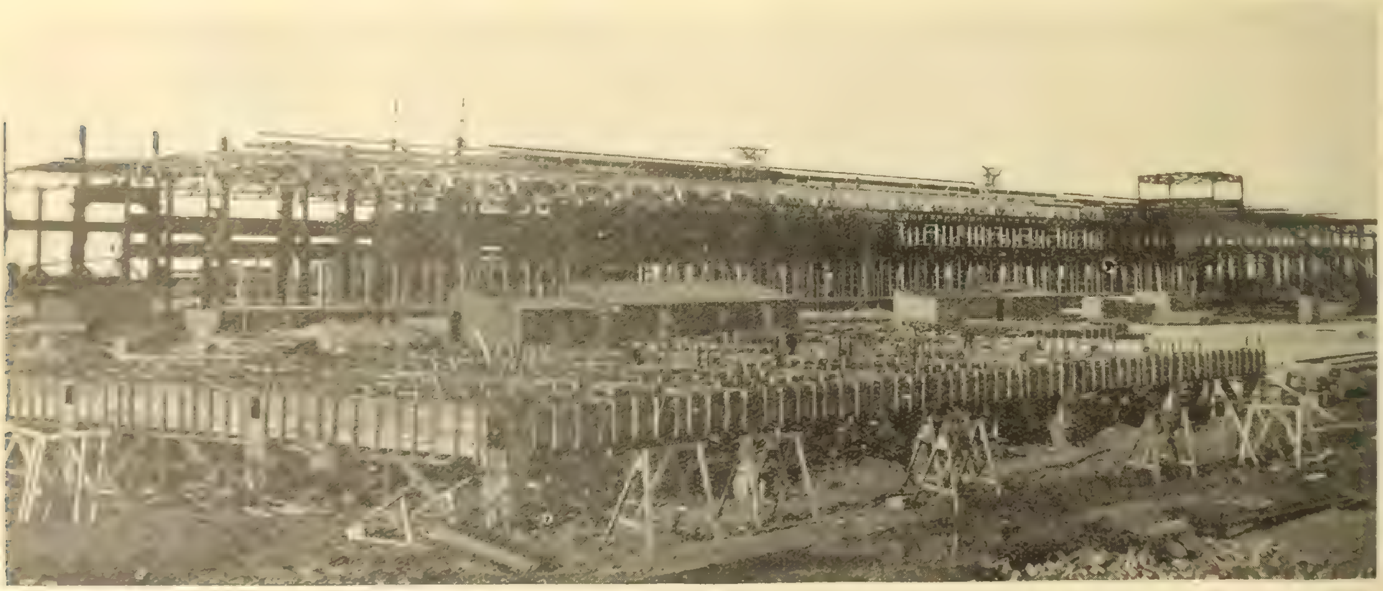
These shops have been designed and erected for the purpose of attending to the repairs, etc., of about 1,800 miles of track. The portion now built comprises about two-thirds of the final plant, and it is expected that the remainder will be put up in the near future. The various buildings are erected on both sides of a midway with a 73-foot travelling crane running along its length, so that material from the different shops can be transferred easily from one to the other. The buildings are kept as close together as possible, making due allowance for future extension, owing to the difficulty of communication between them in very severe weather in winter.

The buildings are, in general, of self-supporting steel frames carried on concrete footings with concrete walls up to the window sills; above that the walls are of brick surmounted by a brick parapet with a concrete coping. The roofing is of wood covered with felt, and asphalt and gravel. The skylights are of thick ribbed glass supported on 3 in. x ¼ in. steel bars at 24 inch centres with copper sheathing to carry the glass. The floors are, in general, of 3 inch wood flooring, spiked to sleepers bedded in bituminous concrete.

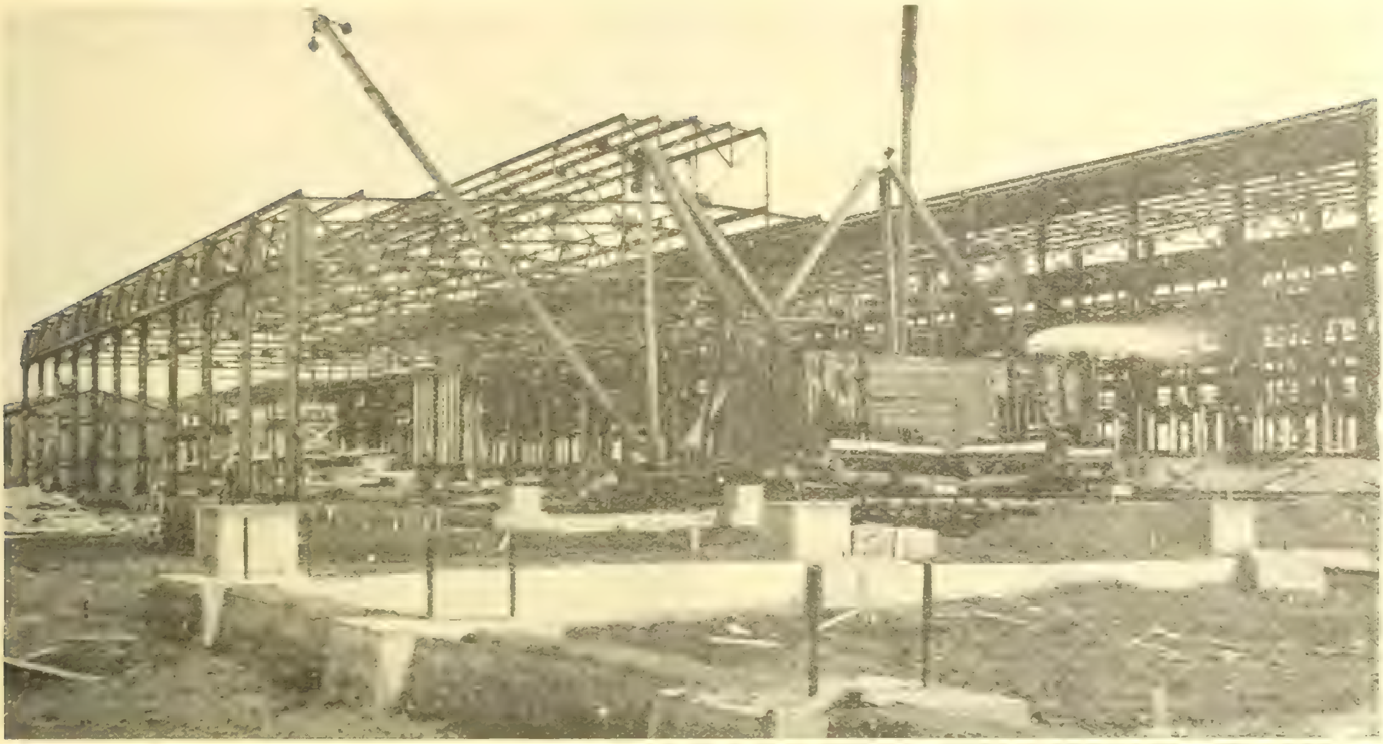
The most important building of all is the locomotive machine and erecting shop, and the boiler and tank shop. These form one building 820 feet long by 170 to 180 feet wide, containing about 3,000 tons of steel. The locomotive, machine and erecting shop consists of three bays 70 feet, 60 feet and 40 feet wide, by 613 feet long. A glance at the general plan sections and elevations will show the layout of the building. The 70-foot bay has a height of about 47 feet to the underside of the trusses. The floor is laid out with 25 engine pits across the bay. There are two doors through which the locomotives come in, and they are lifted by a 120-ton electric travelling crane which carries them along to any particular pit. Underneath the 120-ton crane there is a 10-ton crane for general use.

The columns which carry these crane girders are of a very heavy type of construction. They are spaced at 24 feet centres. The outside wall or "A" line of columns on the 70-foot bay is similar to what is shown on the typical column detail. The shaft is built up of two 10 in. x 20 lb. channels and two 10 in. x 25 lb. channels directly under and carrying the 120-ton crane track girders, and two 10 in. x 20 lb. channels on outside of column. The web is of 36 in. x ⅜ plate and runs up beyond the girder seats, forming a tongue over which the angles of the upper part of the column run. The columns are set on reinforced concrete piers which are carried down to the clay and are of such a size that the pres- square foot. The base of the column is 34 in. x 44 in. x ⅞-in. thick, with 6 x 4 x ½ stiffener angles; the anchors are four 2 in. diam. bolts. There are tie plates of 30 in. x ⅜ in. plate and 3 x 2½ x ⅜ angles about every 8 feet on both sides of the columns rivetted through the flanges of the channels. At a height of 28 feet from the ground are the brackets for the 10-ton crane track girders and 35 feet up the brackets for the 120-ton crane.

The main difficulty in fabricating these columns was in rivetting the inside flanges of the channels through the web plate. No ordinary machine could



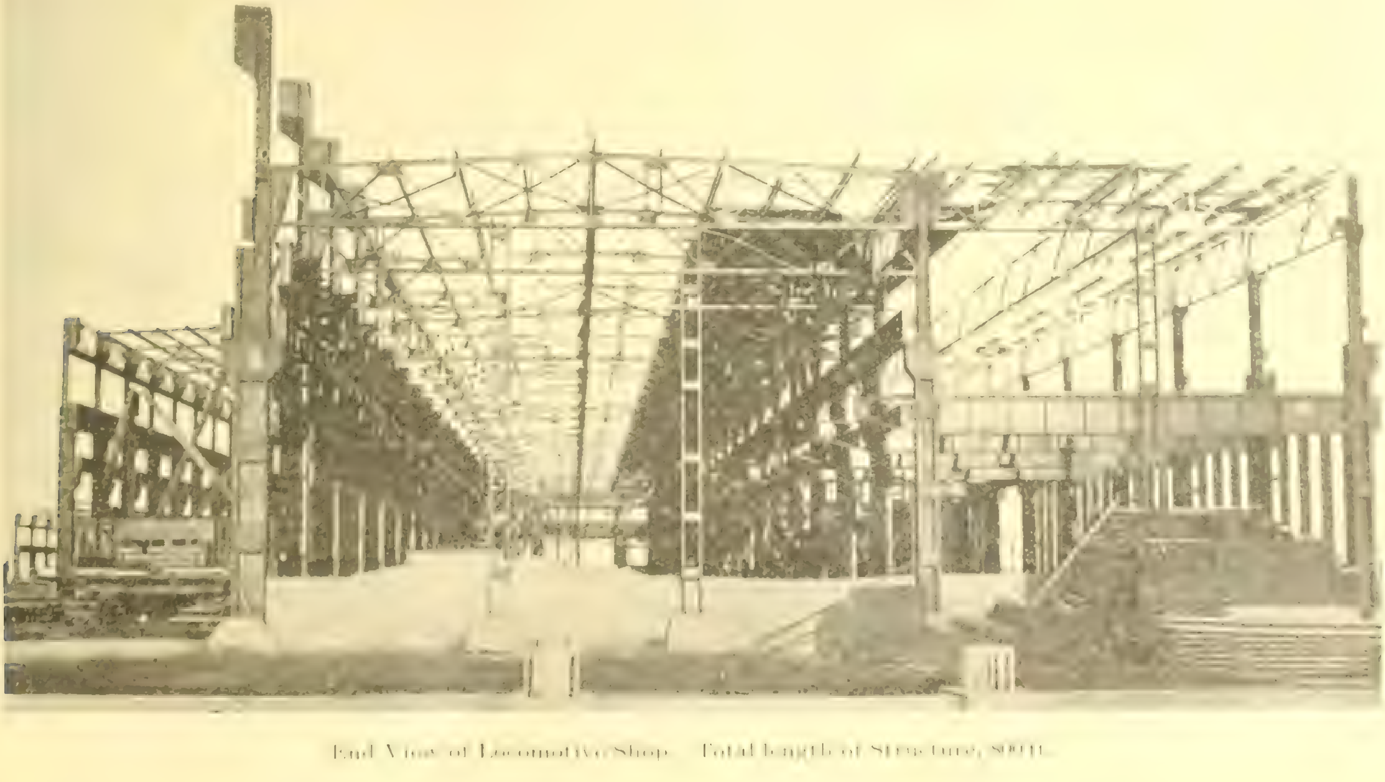
General View of Locomotive Shop. In the foreground are the Forms for Reinforced Concrete Storehouse



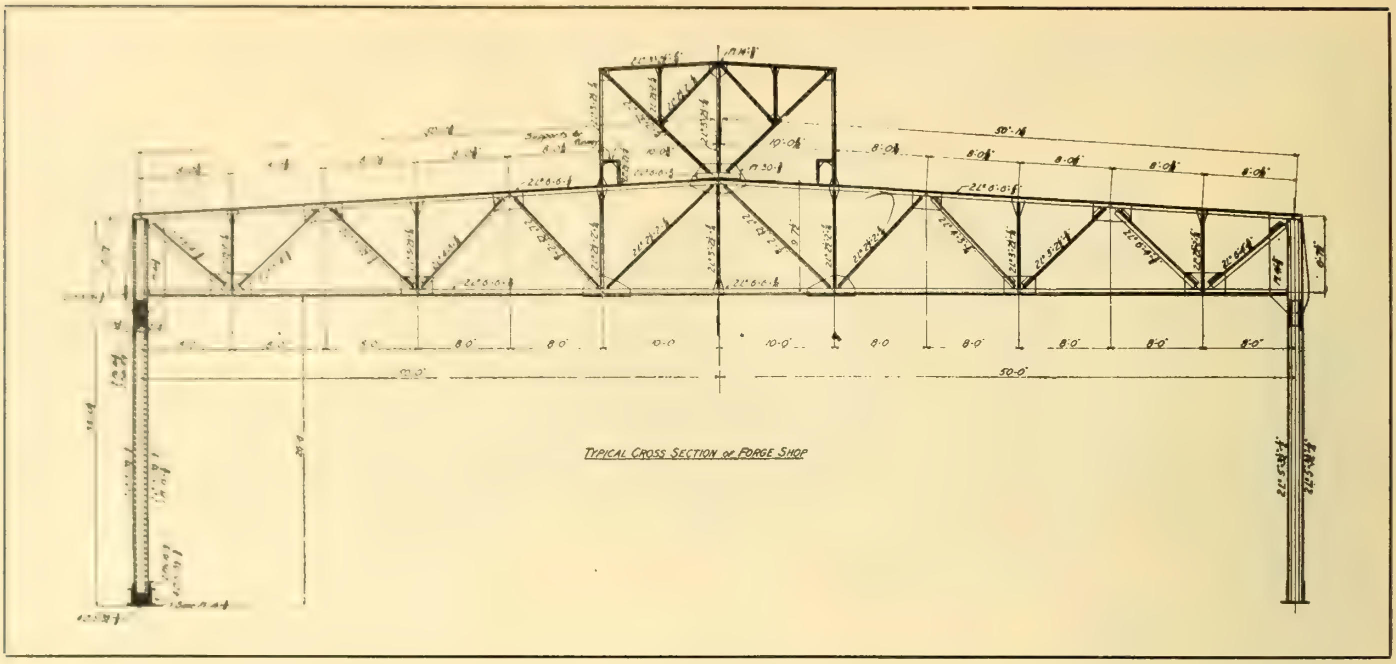
Forge Shop in Course of Erection. Footings for Power House in foreground

get in to do the work, and not being able to get one from any of the rivetting machine manufacturers exactly suited to this work, the steel contractors were forced to design one themselves, as the specifications would not allow of gun rivets being used, but had to be driven by a machine capable of exerting a holding on pressure. A suitable design was prepared and although doubt was expressed as to its practical working, it was cast in their foundry, fitted up and a trial made, when it was found to do the work satisfactorily. A second one was then made, with various slight improvements found necessary, as one was not able to handle all the work.

The inside or "B" line of columns on the 70-foot bay is that shown on the typical column detail. The shaft is of two 10 in. 30 lb. channels, four 10 in. 25 lb. channels and 36 in. x ⅜ in. web. The bases and other details are similar to those described above on the "B" columns. The columns are the heaviest on the whole contract as they carry two 10-ton cranes, one 120-ton crane and the trusses of the 60-foot and 70-foot bays, their weight when completed being close to



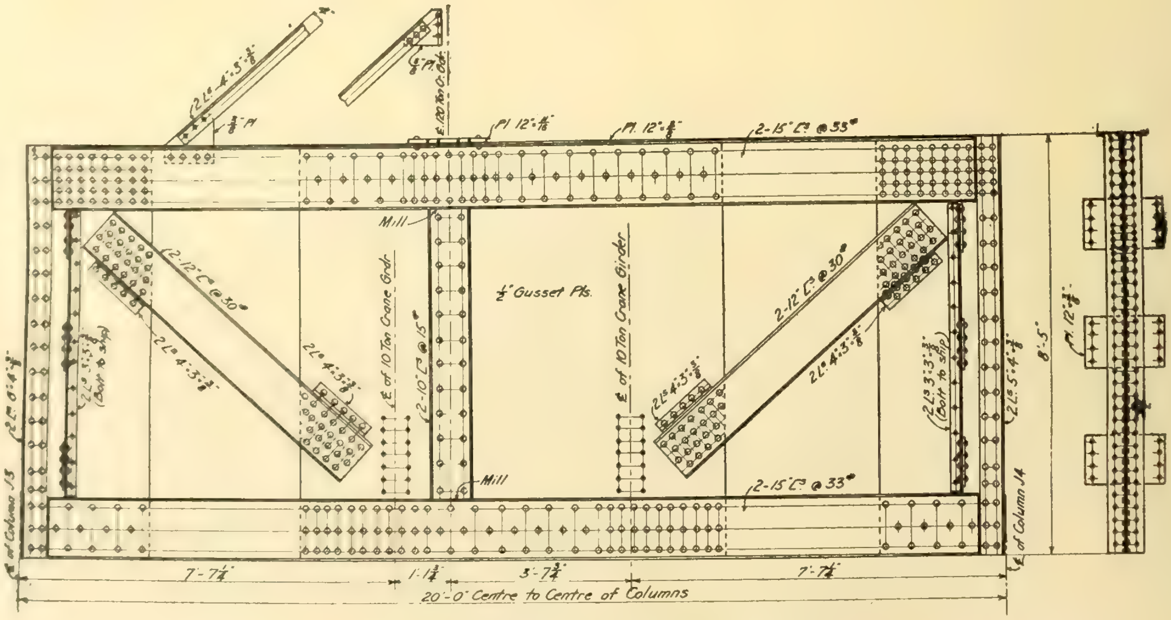
End View of Locomotive Shop. Total length of Structure, 800ft.



8 tons each. The "C" line of columns carry a 10-ton travelling crane and also the balcony on the 40-foot bay. They are of four 10 in. 25 lb. I beams and 24 in. x ⅜ in. web plate. The top portion carrying the roof being of four 5 in. x 3½ in. x ⅜ in. angles and 13½ in. x ⅜ in. web plate. The "D" line on the outside of the building are much similar to the "C" columns, with the addition of connections for future extension so that an extra bay can be added to the shop at any time. At the end of the "C" and "D" line of columns four of the columns are run up to an extra height to form a tower for rivetting up boilers and they carry a 20-ton travelling crane. The space between the "B" and "C" columns is to be used for heavy machines. Part of one end is to be used as a flue shop, and the lye vat and fire furnaces and floor are in this bay.

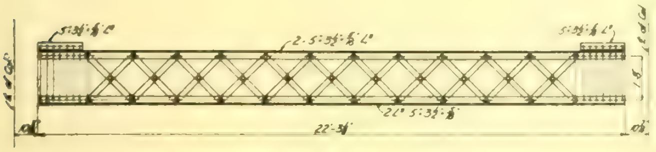
The 40-foot bay, which will be used for light machine work, has a concrete balcony running along its whole length. It is carried on girders 3 ft. 6 in. deep with 18 in. 55 lb. I beams at 6-ft. centres framing between them. On the inside columns there are brackets which carry the balcony out beyond the columns under the travelling crane so that material can be loaded or unloaded directly on to the balcony. This balcony carries the heating apparatus, fans, coils, etc., of which there are three sets. The building is heated by hot air. Steam from the power house is passed through the coils and the air is then drawn through these heated coils and distributed by concrete ducts to the various heating outlets placed at intervals along the walls. The rest of the balcony is used for locker rooms, lavatories, and light repair work, tinsmith and brass departments.

The columns throughout the whole building are very rigidly braced. On the "A" and "B" lines there is X bracing of four 5-in. x 3½-in. x ⅜-in. angles

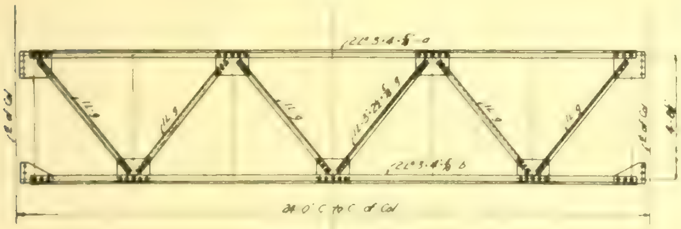


Strut carrying 120-ton Crane Girder and Wall every third bay, as shown on the section BB. Below that there are lattice struts of 5 x 3½ x 5-16 angles with 2¼-in. x ⅜-in. lattice bars. These struts run continuously the whole length of the building. A typical detail of these struts is shown. At the top of the columns there are struts of 4 x 3 x 5-16 chord angles and 3 x 2½ x 5-16 angle diagonals. The lattice struts and X bracing are necessary owing to the heave cranes carried on these columns. On the "C" and "D" columns the only bracing is an angle strut at the top of the columns. A typical detail of these struts is shown. This detail is similar to all the struts used throughout the contract between all trusses and columns. The detail of the large strut shown is the one which carries the end of the 120-ton crane track, and also the wall between the boiler and tank shop and the machine shop.

The trusses are of the type shown on the general section with monitor in the centre which carries the skylight. On the 70-foot bay the chords are of 6 x 6 x ½ angles for the top chord and 6 x 4 x ½ angles for the bottom. The trusses for the 70-foot bay have three rows of struts between them—one in the centre and two intermediate as shown in the general plan. These struts are of two 4 x 3 x 5-16 angles for chords and 3 x 2½ x 5-16 angles for diagonals. The other two bays have a similar strut in the centre only. In the case of the centre struts there are angle diagonals running up to the top of the monitors to act as braces. Every third bay there are top and bottom laterals to the trusses made of 3 x 3 x 5-16 angles. The purlins are in general 12-in. x 20½ lb. channels spaced at 5-foot centres punched for wood strip for nailing roof. On the monitors the purlins are channels and with a beam to form the ridge. On the top flange they have rivetted on the angle cleats for connection of 3-in. x ¼-in. steel skylight bars.

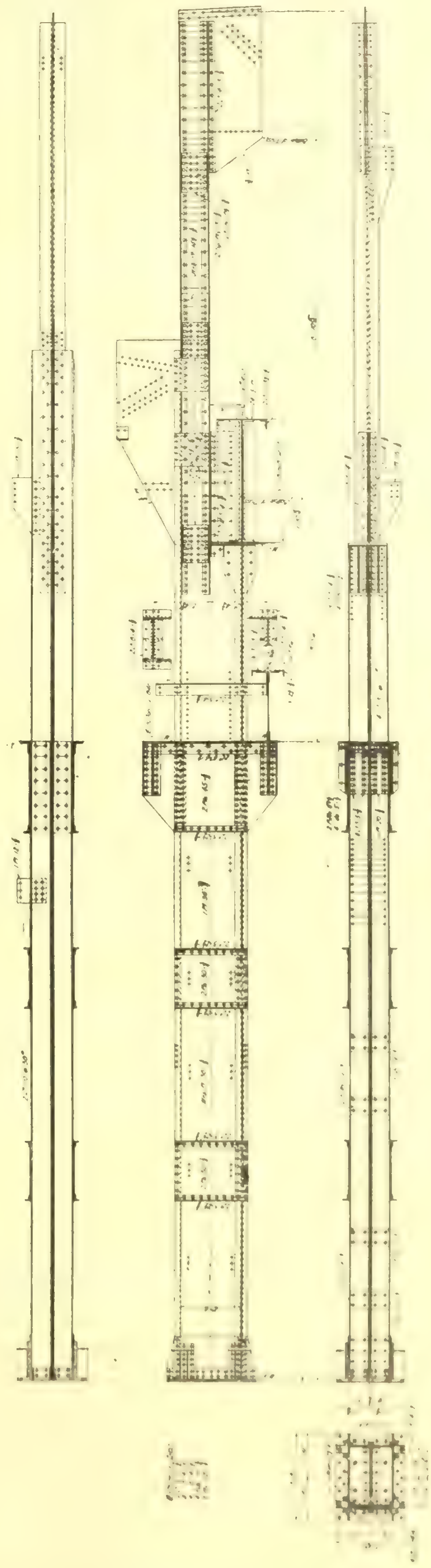


COLUMN BRACING



TYPICAL STRUT

The window framing is in general as shown in the typical detail. The verticals are of 10-in. beams and channels and are tied into the columns by 6-in. x ⅜-in. bent plates. The lintel between the columns to carry the brick work over the windows is of two 15in. x 33 lb. channels, with 15½-in. x ⅜-in. plate rivetted to the bottom. The ends of the lintels are framed into the columns. This framing runs continuously between every column all round the building and similar framing is used around the other buildings. The crane track girders are of a uniform span of 24 feet and for the 120-ton travelling crane are of the following section. The web is of 60-in. x ½-in. plate, the flange angles are 6-in. x 6-in. x 11-16-in. angles, stiffeners 5-in. x 3½-in. x ½-in. angles. There is a top cover



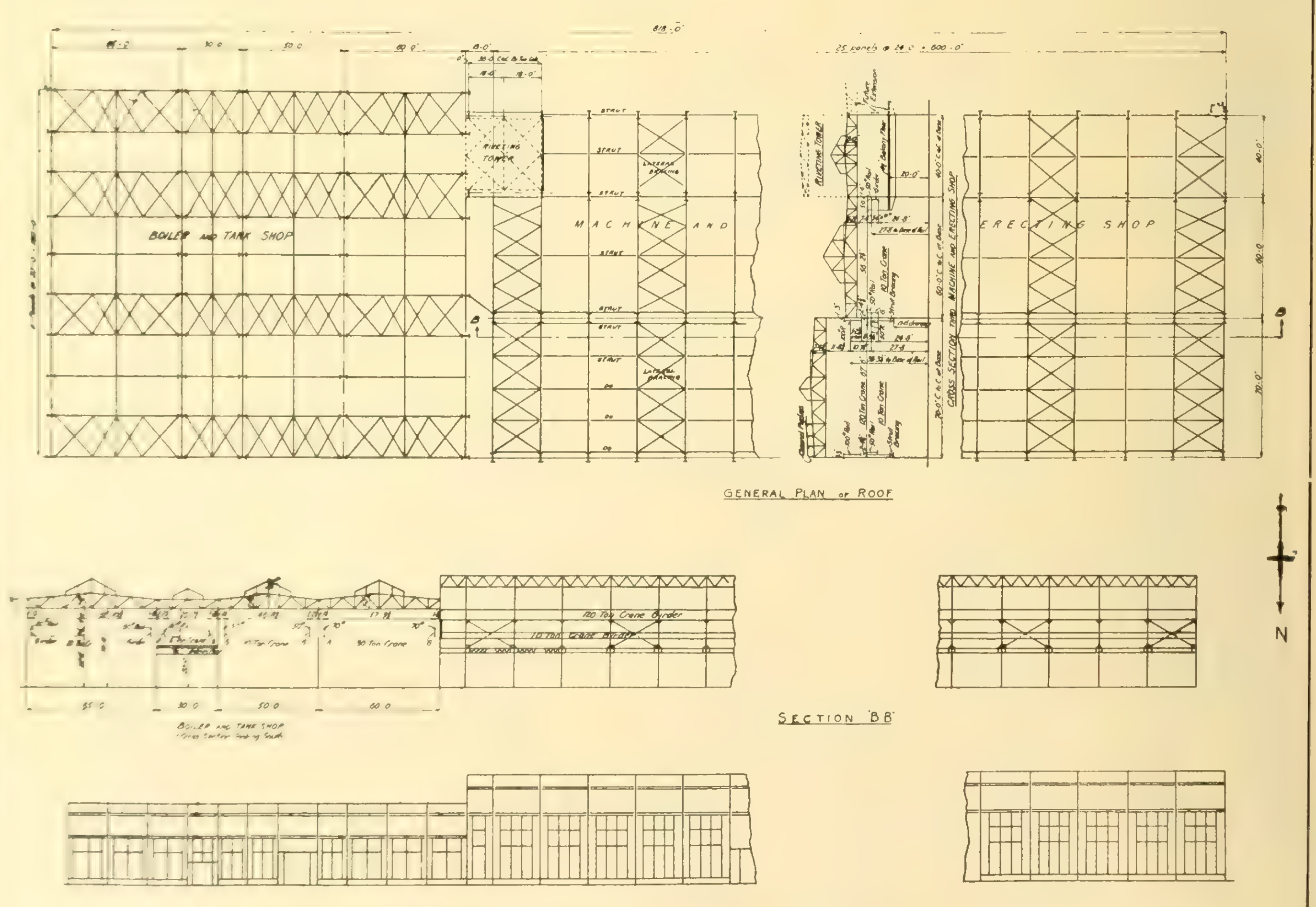
Typical Column

plate 24 in. x [illegible] in. with two 5-in. x 3½-in. x ½-in. angles rivetted one on each side of the plate to give lateral stiffness and resist the thrust due to the crane. The bottom cover plate is 16-in. x 11-16-in. These girders are rivetted through a stiffener to the columns and also bolted to the column seats. The 10-ton crane girders have 35-in. x 5-16-in. web plate and 6 x 6 x ⅜ angles in flanges with two 3 x 2½ x ⅜ angles rivetted to the top flange.

The boiler and tank shop is situated at the end and forms part of the same building as the locomotive, machine and erecting shop. Its dimensions are 180 feet by 205 feet. It consists of four bays, 65 feet, 30 feet, 50 feet and 60 feet wide, and 36 ft. 6 in. high to the underside of the trusses. The layout of the bays is shown on the general elevation. The 65-foot bay is spanned by a 20-ton crane and is to be used for work on locomotive tenders. The 30-foot bay is to be used for light machinery, and over 100 feet of its length is a balcony similar to that in the locomotive shop and which carries the fans, etc., for heating the shop and also the locker rooms, lavatories, etc. Over the rest of the bay there is a 5-ton electric travelling crane. The 50-foot bay is to be used for heavy machinery and is spanned by a 10-ton travelling crane. The 70-foot bay is for boiler work and has a 30-ton crane over it. The steel work is similar to the rest of the locomotive shop, adapted to suit the different loads and conditions, but the general design and details are the same.

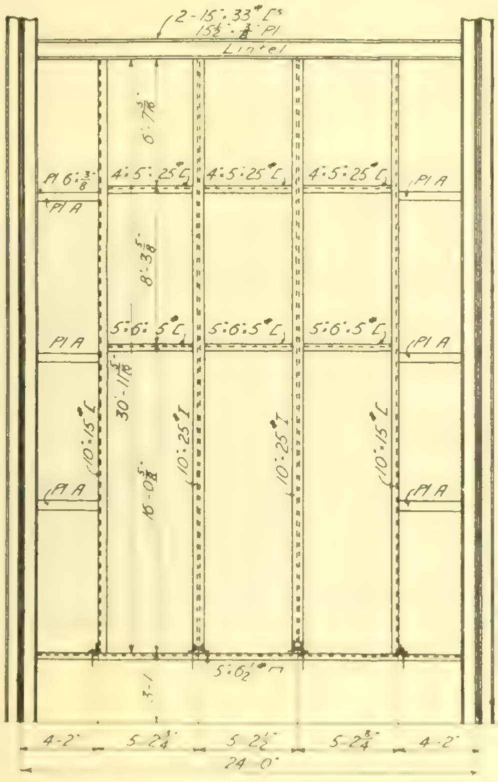
The forge shop is a building 260 feet long by 100 feet wide. As it carries no overhead cranes the columns are only light wall columns sufficient to carry the roof trusses. They are or four 5 x 3½ x ½ angles with 15-in. x ⅜-in. web plate. The trusses are of one complete span over the width of the shop, with chord angles of 6 x 6 angles. The gusset plates at the ends of the trusses are carried out beyond the columns to carry the lintels and window framing, which are similar to those described above and shown on the general detail of window framing. In the centre of the trusses there is a monitor 20 feet wide by 10 feet high with a runway each side. Owing to the vibration which may be caused by the heavy hammers, etc., which will be used, the building is braced very rigidly with struts and lateral bracing, which except for their number call for no special comment, as they are exactly similar to those described above for the locomotive shop.

The description of the steel for the above two buildings shows in general the two styles of steel work which were carried out in all the other buildings. Where there are heavy loads to be carried by the columns they are in all cases made of beams and channels similar to those described, and where they only carry relatively light loads, such as roof loads, they are only of plate and angle similar to the forge shop. These same styles were carried out in all the buildings and a detailed description of the steel work in them would be more or less of a repetition. Therefore a general description of the rest of the buildings is all that will be attempted.



Elevation Showing Window and Door Framing

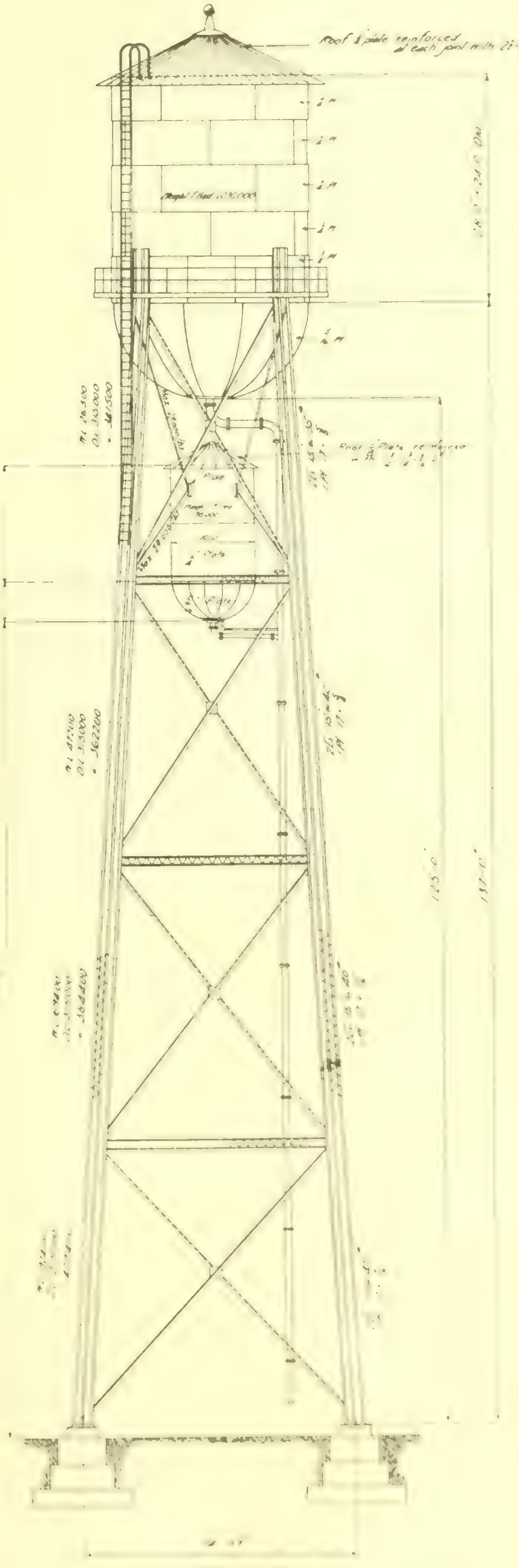
The steel in the locomotive shop and the forge shop comprises over 3,000 tons. The next building in point of size and importance is the Grey iron foundry. Its dimensions are 200 feet by 130 feet, with a cleaning room on one side, 60 feet by 80 feet, It consists of a central bay of 70-foot span with two side bays 30 feet wide. The 70-foot bay is spanned by a 15-ton crane which is carried on crane girders supported by the usual beam or channel columns. This part of the foundry will be used for the moulding floor. One 30-foot bay has the brass foundry which is enclosed by expanded metal screens and also the locker rooms, lavatory and heating apparatus. The other 30-foot bay has at one end the moulding floor for scrap castings and at the other end the core room and core ovens. Between these is the cupola room with two cupolas with an elevated steel charging floor. On the south side of the building is the room for cleaning castings with a 5-ton electric crane for handling them.



Typical Window Framing

The power house is a building 150 feet long by 110 feet wide. It is divided by a brick fire wall into two parts 45 feet and 60 feet wide. The narrower part is for the boilers and the other for the engine room. The boiler room will contain ten water tube boilers and all the necessary coal hoppers, etc. The engine room will have the compressors, pumps, generators, switchboard and all the other power machinery. The engine room is handled by a 10-ton hand operated travelling crane. The general features of the building are the same as the other buildings: concrete footings, steel framework and roof, brick walls above window sills, and prepared roofing.

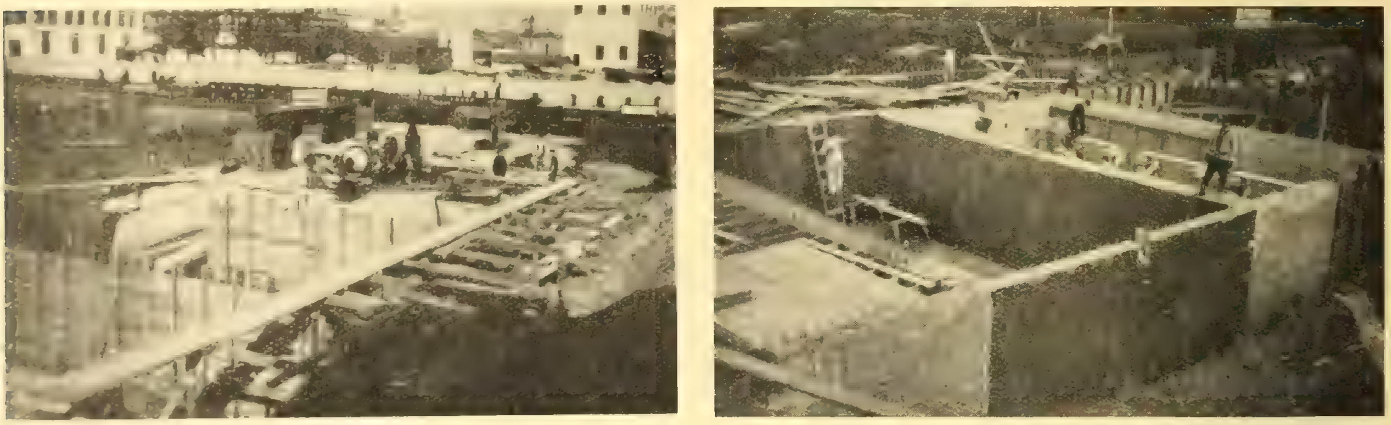
There are a number of other smaller buildings which call for no special comment; the stores platform—a steel frame 56 feet by 180 feet; the locomotive carpenter shop, 70 feet by 100 feet; the store house, a reinforced concrete building, 60 feet by 260 feet; the oil house, and the frog and track shop.



Water Tank

An interesting feature was the arrangement made for the water supply of the shops. The water for general use is obtained from the relatively soft water of the Red River. No provision has yet been made at the shops for softening this water, but it will probably be yet found necessary as the C. P. R. are installing a plant at their Winnipeg shops for treating the same water. On the bank of the river there is a pump house from which the water is pumped to a 2,000,000-gallon reservoir at Transcona. To give the necessary pressure for distribution it is then pumped to a 100,000-gallon elevated steel tank 125 feet above grade. The Red River water not being suitable for drinking, a small tank of 10,000 gallons capacity is suspended below the large tank and drinking water is obtained from a well which is pumped into it. A detail of this tank is shown with stresses and sections. The tower is of 15-in. channels with one 17-in. cover plate and latticed on the other side. It is of four panels with the necessary angle bracing and struts. The tank is 24 feet diameter and 28 feet high with hemispherical bottom of 5-16 in. plate. The straight tiers are of ⅜ in. and ¼ in. plate, with ⅛ in. conical roof, reinforced with angles.

The total amount of steel in the whole contract was 4,600 tons, which was fabricated and erected by the Manitoba Bridge and Iron Works, Limited, Winnipeg. Messrs. Haney, Quinlan & Robertson are the general contractors. The whole work has been carried out under the supervision of Mr. R. F. Uniacke, bridge engineer, National Transcontinental Railway, Ottawa, and under the inspection of the Canadian Inspection Company. The actual construction of the shops is under the supervision of Mr. F. W. Walker, superintendent of terminal shops for the National Transcontinental Railway.



Reinforced Concrete Oil Tanks in Course of Construction at Toronto—Contractors : Foundation Company, Ltd., Montreal

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Another step towards the realization of a "Greater Vancouver" was taken when the ratepayers of the large and populous section known as South Vancouver, voted in favor of annexation to the city. Legislative action will be necessary to ratify the step, and some time must elapse before the union becomes a fact. The total assessment of the new suburb is $13,500,000; its area is over 14 miles, and the population is between 27,000 and 30,000. The inclusion of this district gives Greater Vancouver a population of approximately 155,000, which is increasing at the rate of about 1,000 a month owing to the influx from the east and Pacific coast points.

Reinforced Concrete for Oil Tanks

The Queen City Oil Company completed last fall some work at their West Toronto yards which may be of interest to readers of the Contract Record. This work consisted in the building of four reinforced concrete tanks for the storage of gasoline. To the knowledge of the writer, this is the first time that concrete has been put to this use in Canada, although the Standard Oil Company have built several at their Bayonne works in the United States.

On account of certain city regulations, these tanks were placed below ground and completely backfilled on top. Owing to confined space, the tanks were built rectangular in form (each tank 21 ft. 6 in. x 38 ft. long x 9 ft. 6 in. high) having total exterior dimensions of 94 ft. x 40 ft. x 6 ft. The tanks are to be filled by gravity from tank cars and used for the distribution of gasoline in West Toronto.

Work was started by excavating to just above the water level in the soil. This excavation was taken out by scraper teams, the final trimming being done by benching out. A concrete mat was deposited all over the bottom of the excavation and on this were built four tanks side by side but independent one of the other. A tile drain surrounded by broken stone was placed around at the bottom and on the outside of the walls. This drained into two sumps, one on each side at the centre of the four tanks. Square reinforced steel was used throughout, and the concrete was of a rich, dense mixture. The walls and floor were poured continuously so as to do away with any bonding of old and new concrete, the gang working as late into the night as was necessary to complete each tank.

To economize time, the forms for two tanks were set up at one time, and after these had been poured and the concrete sufficiently set, the forms were stripped off and set up again for the remaining two. After the walls had hardened sufficiently, the roof and its supporting columns were placed and the slab poured. Two manholes were left in the roof of each of the tanks. These are to be used for the intake and discharge pipes and also for the cleaning out of the tanks. At the completion of the work a water test under a maximum head was made on each tank. These tests showed the tanks to be perfectly tight.

The above tanks were designed and built for the Queen City Oil Company by the Foundation Company, Limited, Bank of Ottawa Building, Montreal.

Road Construction for Heavy Traffic

Special Treament Necessary for Suburban and Country Roads—Quality of Stone—Methods of Applying Tar and Other Materials

Specially Contributed by W. A. McLean, Provincial Engineer of Highways for Ontario

Country roads, as with city streets, are not all of a kind. On the contrary, there is a wide gradation to choose from, in order that varying local conditions with regard to traffic, materials, and general design, may be best adapted to one another. One strength of pavement is suitable for the heavy dray traffic of a wholesale district in a large city; another type is suitable for a lightly travelled residence street; and still another for a city park. In the same way country roads should be adapted to the factors which present themselves. There cannot, economically, be a standard specification for a country road, to be followed universally. The problem, at times, is a complex one, if the best combination of efficiency and cost is to be served. New materials are from time to time presenting themselves, which have to be tested under a great many conditions, and for a considerable period in order that their value and place in road-building may be determined. The character of traffic is subject to change, and at present, rapid motor vehicles, and heavy traction engines are adding their energies to narrow tires, frost and weather as agencies of road destruction.

In general, it may be said that gravel roads are suited to light driving, broken stone resists more constant and heavier travel, oils and bituminous binders help to preserve these, and concrete and vitrified brick are employed on heavily travelled suburban roads near large cities. Foundations of various kinds are used according to the weight of traffic, and the natural strength of the subsoil.

Roads adjacent to, and radiating from large cities, are frequently subjected to heavier traffic than are many expensively paved city streets. On leading suburban roads is concentrated a large amount of farm traffic from the surrounding districts. Some is only occasional during the year; miscellaneous loads come in at weekly or other regular intervals; while some, such as heavily loaded milk wagons are of daily occurrance. On some of these roads brick, gravel and sand are regularly hauled in heavy loads; and outlying factories create heavy traffic in certain cases. Heavy loads of merchandise are daily hauled away from the wholesale houses of the city, delivery wagons make regular trips; while additional light driving and automobiles make a total amount of travel that subjects leading suburban roads to a severe traffic test.

Common gravel, even of a good quality, ruts readily in such roads, requires constant repairs, and invariably in the fall and spring is flattened and cut up so that a dry surface is impossible. Broken limestone is plentiful in eastern Ontario, and is being used for heavy traffic, but even this material, laid in the ordinary way as water-bound macadam, is not strong enough for severe wear. It is almost impossible to prevent vehicles following one another in a narrow wheel track, and this constant wear soon creates a depression. On ordinary water-bound macadam, the dust nuisance has to be met, working as it does, discomfort to the users of the road, and injury and loss to property adjoining the road.

Quality of Stone.

The first remedy that suggests itself is the securing of a harder material than limestone. Trap rock stands first among the stones suitable for road construction. This is an exceedingly hard and tough rock and is found in various parts of northern Ontario. It is quarried on Poole Island in Georgian Bay, and is used largely in Cleveland. The cost is much greater than of limestone owing to the transportation charges, but as deposits occur in Eastern Ontario, there is an opportunity to secure it at reduced freight rates. Granite is quarried in Northern Ontario, and is strong and less dusty than limestone. A wearing surface of three or four inches of granite or trap rock, over a limestone foundation, if properly laid and maintained, would make a much more durable road for heavy traffic, than can be secured from limestone alone. The harder stone is the more expensive to quarry and crush, but wears very much better on the road.

Oiling Roads.

The experience of Toronto and other cities, in oiling roads was last year extended to a few country roads in the province where the dust nuisance was a chief consideration. The oil generally used was a Canadian petroleum oil, having a paraffine base, and was sprinkled from an ordinary watering cart. This quality of oil coagulates the dust, so that it is too heavy to be blown by the wind, remains on the road surface, and creates a protective coat. Two or three applications of oil are made within a fortnight, early in the summer. This is followed by applications four or six weeks apart during the summer. To keep down dust for the season will ordinarily take four applications of oil, requiring about 3,500 gallons per mile, at four cents a gallon for the oil, and one cent for sprinkling.

Oils with an asphaltic rather than a paraffine base, are preferable, but the duty increases the cost. In the United States, asphaltic oils are commonly employed, containing from 40 to 80 per cent. asphalt. Greater care is required in applying asphaltic oil to the road than in applying thinner paraffine oils. The general method of sprinkling with asphaltic oil is much the same where used, and may be instanced by the Borough of the Bronx, N.Y., where dust laying is secured by a cold application of 50 per cent. asphaltic oil. It is distributed from an ordinary sprinkling wagon, about one-quarter gallon to the square yard of road. The treatment is applied to one-half of the road at a time, traffic being closed for from four to five days to allow the oil to penetrate the macadam and to harden. The application is repeated so as to give for the season one-half gallon per square yard. The oil is put on in June, July and August, as the dampness of spring and cool nights of fall limit the penetration of the oil which has been as much as 1½ inches. In this way slime and mud during and after rains is prevented. The cost in the Bronx is about [illegible] per square yard per year. The road is swept to remove an excess of fine material before applying the oil.

High pressure sprinklers are used in some cases. The State Highway Commission of Massachusetts has imported such a sprinkler from England. The penetration of the asphaltic oil into the roadbed is aided by this method. The use of high pressure sprinklers is also favorably reported from East Orange, N.J., and elsewhere. Some highway engineers allow the oil to remain on the road for five or six hours to permit penetration of the oil, and evaporation of volatile matter, after which a light coating of stone screenings is swept or spread over the surface.

According to Massachusetts' experience, it is better that the road be somewhat damp when oil is applied, but in other cases a dry surface is sought, and in this regard practice is not uniform.

The cost of oiling varies according to locality, freight charges, amount, and class of oil used. Asphaltic oils are controlled by the Standard Oil Company, and the demand is so great that prices tend to advance. Asphaltic oiling costs from 5 cents to 10 cents a square yard for the season.

Tarred Roads.

The tarring of roads is largely practiced in Great Britain. In 1908 there were about 2,000 miles of tarred roads in England, but last year this had been increased to about 10,000 miles. The oiling of roads with light oils, while somewhat reducing wear, is principally a dust palliative, but English practice in the use of tars seeks to combine with the reduction of dust, a material to bond, strengthen and preserve the road. There are four ordinary methods of using tar: (1) Tar painting, and spraying; (2) tar grouting; (3) tar macadam; (4) tar matrix. The tar used is coal tar, and with it is combined creosote oil and pitch.

Road at Swampscott, Mass.

Tar painting and spraying is similar in its results to the use of oil, and resembles strongly the use of asphaltic oil. Its effect is temporary, lasting only for one season, and when broken up, the road is left in a dirty condition. The road is first cleaned of all dust and caked mud, and a thin coat of tar is then spread in various ways by hand and by machine. A light coating of screenings is sprinkled over the surface.

The process of tar grouting consists in spreading over the road a surface layer of broken stone which is rolled smooth. Over this is poured hot tar from spray cans, filling the spaces between the stones. Stone chips are lightly sprinkled over the surface, and consolidation by rolling is then completed.

Tar macadam roads are built by coating the stone thoroughly with tar before laying on the road. A foundation of coarse stone is first laid; or an old macadam road is used as a foundation, first cleaning away all dust and mud. The tarred stone is then spread in layers, which are rolled separately, and the whole is coated with dry screenings before final consolidation with a roller.

"Tar matrix" is a term applied to roads in which fine, tarred gravel or stone chips are used to fill the interstices of an ordinary macadam road, thus sealing and making the road surface impervious. There are three methods of construction. One way is to prepare and roll a good foundation of broken stone. On this is spread the tarred material to a depth of one or one and a half inches. Then a layer of broken stone about three inches in thickness is spread, and the road is rolled until the tarred gravel comes to the surface, making a smooth and well bounded surface. Another way is to spread the tarred matrix over the broken stone and roll it into the interstices. A third method, the "Gladwell system," is a combination of the two.

Tar in road-making has not been favorably regarded in Ontario, as the results have been considered too uncertain. Tar macadam roads were at one time used in Hamilton, and in Ottawa, but its use has been largely discontinued. This is due in part to the decreasing price of asphalt, and to the unscientific way in which tar was employed in the pioneer work. A fuller knowledge of the characteristics of tar is leading to more satisfactory results, and that it has a useful place as a roadmaking material cannot be doubted. In English experience, tar macadam is considered too expensive for general application, but tar grouting is found satisfactory for country roads. The refining of tar to remove volatile oils, the addition of creosote oil and pitch, with an occasional tar painting to seal the surface as it becomes brittle, are among the more important factors in the successful use of tar.

English experience shows that, in general, tar painting costs 6 cents a square yard; tar grouting adds 42 cents a square yard to the cost of the road; and a tar macadam surface over an old roadbed costs 80 cents to $1 a square yard.

Asphaltic Binders.

In addition to the use of asphaltic oil as a dust-layer, this material, as well as refined asphalt, has been used to form a bituminous wearing surface in apparently every way that human ingenuity can devise. In general the methods employed in the use of tar are followed and may be classed in the same way as (1) spraying and painting; (2) asphalt grouting or the penetration method; (3) asphaltic macadam; (4) asphaltic matrix.

The latest development is the use of asphaltic oil by the grouting or penetration method. After a foundation or lower course of macadam has been laid and well consolidated, a surface layer of finer crushed broken stone is spread and partly rolled. Over this is flushed a grout of asphaltic oil containing 75 to 85 per cent. asphalt; or refined asphalt heated and fluxed is used. A light coat of screenings is spread, and the road is well rolled. This is followed by a surface painting or spraying of asphalt or asphaltic oil and a final sprinkling of stone screenings is added, after which solidification is completed with the roller. Asphalte, a mineral pitch, resembles tar, but is of more uniform quality, and the results in Ontario have been more certain.

The cost of asphaltic treatment has not been determined in any definite degree owing to the experimental stage in which its use remains, but in a general way it has been found to add 50 per cent. to the cost of the road. In New York State the use of an asphaltic binder is found to add about $2,000 per mile to the cost of a water-bound macadam.

Concrete Roadways.

Concrete pavements for town streets have been in use for a few years, with increasing popularity. The use of concrete has been extended to country roads, one of the most notable instances being that of Wayne County, Michigan, surrounding Detroit. The roadways are ordinarily 24 feet wide with concrete 10 to 18 feet wide, and the shoulders gravelled. The roads are laid in two courses, the lower, 4 inches thick, and the wearing surface 2½ inches. The difficulty with concrete in the past has been that it has a very hard, smooth surface, with insecure footing for horses, that temperature cracks are difficult to prevent, that it is brittle and chips away at expansion joints and temperature cracks, making holes difficult to repair. The city engineer of Ann Arbour has, however, had much success with a plan of tar-painting which overcomes these difficulties, and promises to make concrete, in proportion to its cost, one of the cheapest of pavements, and one especially suited to suburban traffic on main highways. Concrete pavements cost about $1.25 a square yard; and the tarring costs about one cent a square yard per year.

Vitrified Brick.

The vitrified brick roadways around Cleveland have become deservedly famous. Vitrified brick are largely manufactured in Ohio, so that the cost at Cleveland is reduced to a minimum. These brick pavements, as with the concrete roadways previously described, are laid only the necessary width to accommodate traffic, usually from 10 to 18 feet wide, with broken stone or gravel at the sides, making a total width of 24 to 28 feet. between gutters. A concrete foundation about four inches thick is first laid. On this there is spread a sand cushion two inches thick, which is compacted with a 500 pound hand roller. Over this are laid the vitrified brick, and the joints filled with a Portland cement grout. Concrete curbs hold the sides in place; below which are tile under-drains. Vitrified brick pavements in Ontario are costing about $2.50 a square yard.

Proprietary Pavements.

To the roadmaking materials just described might be added a lengthy list of patented and proprietary mixtures and methods, such as tarvia, warrenite, bitulithic, glutrin, amiesite, texaco, tarmac, and many others. Westrumite is asphalt held in liquid form by the addition of spirits of ammonia. On exposure to the air the ammonia evaporates, and the asphalt toughens and solidifies. Rocmac is a material of a different class, and is supplied as a liquid which, mixed with limestone dust, on exposure to the air, gradually forms silicate of lime, a very strong binder. Test sections were last year laid at Niagara and Woodstock, and a road was built at Port Arthur. Experience in England and Scotland, while limited to about four years, is said to be favorable.

The illustration shows a road built by the Massachusetts Highway Commission, metalled 15 feet wide with trap rock on a cobble-stone foundation. The surface was treated in 1909 with two applications of asphaltic oil, each one-quarter gallon per square yard, and followed with a light dressing of sand and pea stone. The photo was taken in 1910, the surface having had no oil during the summer, but a light coating of sand and fine stone.

New Waterworks System at Coldwater, Ont.

There has just been inaugurated a supply of water by gravitation for the town of Coldwater from plans and estimates prepared by the John Galt Engineering Company.

The sources of the supply are three creeks, situated at a distance of one and one-half miles from the town. The waters of these creeks were impounded by building a small concrete dam across each stream and leading the waters into the storage reservoir by means of tile sewer pipe.

The storage reservoir, situated at an elevation of 140 feet above the main street of the town, is rectangular in shape, its length being 167 feet and its width 82 feet with inner slopes of 2 to 1 and outer slopes of 1½ to 1. The reservoir holds 10 feet depth of water and has a capacity of about 516,000 gallons. The reservoir is formed partly in excavation and partly by banking, the amount of excavation being 2,600 cubic yards.

The inner walls of the basin were lined throughout with a layer of puddle clay, and on this was laid a layer of sand 3 inches deep. The entire walls and floor of the reservoir were then paved to a uniform depth of 8 inches with field stones roughly dressed, the paving being grouted with cement mortar

From the reservoir an 8-inch cast iron pipe, 5,000 feet in length, was laid through the bush into the town, and within the town 3,600 feet of 8-inch, 3,800 feet of 6-inch and 5,500 feet of 4-inch cast iron pipe, with all the necessary valves, and 24 fire hydrants were laid.

The average daily flow from the springs is 150,000 gallons and as the population of the village is barely 900, an ample supply of water will be afforded for many years to come.

The quality of the water is pure, soft and colorless, and is excellently suited for dietetic and manufacturing purposes.

The pipelaying was carried out by Mr. John F. Connolly, Toronto, at a contract price of fully $18,000. The reservoir contract was carried out by Mr. Geo. Moogk, Waterloo, Ont., the contract amounting to over $3,500.

The work was designed and superintended by the John Galt Engineering Company, of Toronto and Winnipeg, represented on the ground by Mr. Geo. D. Mackie, C.E.

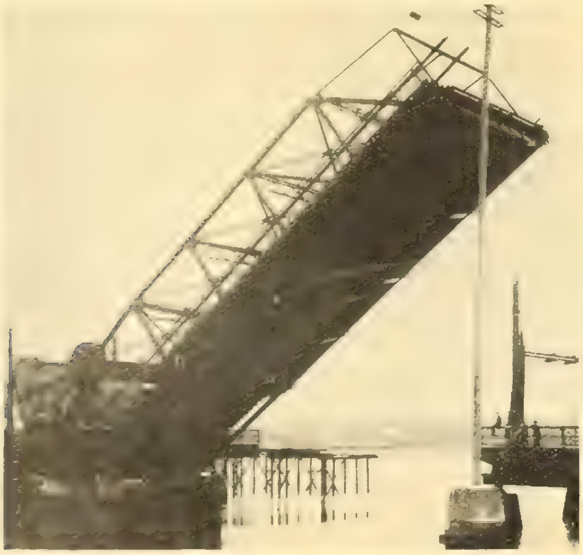
A new skyscraper in New York City is the Woolworth Building, at the southwest corner of Broadway and Park Place 105 ft. on Broadway, 197 ft. on Park Place. The area covered is 18,500 sq. ft. The building will contain 45 stories and rise to a height of 625 ft. above the street. The foundations will consist of 38 pneumatic caissons carried to bed rock at a depth of about 112 ft. below the curb, or 77 ft. below ground water level. There will be three floors below the street level, the elevation of the lowest being 37 ft. 6 ins. blow the curb. These piers will be sunk to bed rock with the aid of compressed air and will be circular in form. The entire caisson, including the working chamber, will be constructed of reinforced concrete. This work is to be completed by March 15, 1911, by the contractors, the Foundation Company of New York. The building will cost, including the land, about $7,000,000.

New Bridges over False Creek at Vancouver

Design and Erection of the Westminster Avenue and Granville Street Bridges—Details of Operation, Progress and Cost

These two bridges are located in Vancouver, B.C., and cross an arm of the sea called False Creek. The upper one, which is at the present head of navigation, is on Westminster avenue, and replaced a wooden structure, which was removed by the contractor before the work of the present substructure was begun, but not before a temporary wooden trestle on piles was constructed to carry the street railway, wagonway, and sidewalk, a short opening being provided over the deepest part of the creek to permit the passage of small boats. The lower one is at Granville street and was built alongside of the old structure, but far enough away from it to prevent the slightest interference of any kind from either street or river traffic.

The Westminster avenue bridge consists of a 128-foot bascule span at the middle of the crossing, flanked at each end by a 75-foot deck plate girder span with an embankment at each approach. The bridge carries a double track street railway in a roadway forty-two feet wide, the distance between central planes of trusses being forty-three feet six inches; and two seven foot sidewalks are borne outside the trusses by cantilever brackets. The roadway flooring of the movable span consists of Australian hardwood planks 2 inches thick, laid transversely to the structure on creosoted planks of Douglas fir 4 inches thick, laid longitudinally. These lower planks rest on 6-in. x 9-in. cross ties of creosoted fir, hook bolted to the stringers, and spaced 30- inch centers. The stringers are of rolled I-beams "Bethlehem Special" section. The sidewalk floor consists of 2-in. Douglas fir planks, supported by longitudinal Douglas fir joists. Outside of each sidewalk is a substantial steel handrail weighing about fifty pounds per lineal foot. The roadways of the two approach spans are paved with creosoted Douglas fir blocks, and their floor systems are similar to that of the movable span.



Raising the Bascule Span, Westminster Ave. Bridge, Vancouver, B. C.

As will be seen in Fig. 1, the bascule span is of the simplest possible type. There is no machinery of any kind upon the span itself, that for rotation being located in a small house beneath the south approach span; while that for locking the end of the span and operating the portcullises, or gates, is placed at the inner ends of the approaches. The span and its live load are supported by an overhead axle, resting on pillow blocks which are carried by steel bents, and the whole supported by two concrete piers beneath the axle and two concrete pedestals at the end of the span. These piers and pedestals rest on pneumatic caissons built of timber and concrete, and are sunk to bed rock. The flanking spans rest at the ends of the bridge on concrete retaining walls supported by concrete footing courses sunk into the bed of the stream to a depth of about four (4) feet.

This overhead axle is of a unique type, and its special features have been covered by patent in both Canada and the United States. It consists of a large box-girder, built of plates and angles and having holes in the webs large enough to permit the entrance of a man. At each end it has a large steel casting rivetted to it in such a manner as to make the joint fully as strong as the main section of the girder. Where the casting is thus rivetted to the built girder it is flanged in four rectangular planes, but beyond the connection it is solid. Where the truss rests on the casting the bearing is a spherical surface, and where the casting rests on the journal the bearing is a cylindrical surface at right angles to the axle. The latter is fixed, and the trusses turn upon it, the bearing surfaces being well lubricated automatically. When the axle deflects, as it undoubtedly must, the bearings slip slightly and each truss adjusts itself so as to avoid all secondary stress that would otherwise be caused by the unequal bearing on its two sides.

Again, as the axle deflects, the cylindrical bearing on each support slips slightly, and the load remains vertical.

Each embankment consists of two rock walls with earth filling between. The exterior and interior faces of these walls are of large broken stones carefully laid; the interior is filled solid with broken stone of various sizes, thus reducing the percentage of voids to a minimum.

The trusses of the movable span are of the rivetted Pratt type. The lateral bracing is of the usual rivetted type. The steel bents referred to above are stayed against longitudinal wind thrust by their spread legs, and against transverse wind thrust by knee struts extending to the projecting ends of a lattice girder, which passes through the concrete piers and which is entirely surrounded by concrete to protect it from the corrosive effects of the salt water. The movable span is counterbalanced by a block of concrete in the rear overhead, so placed that the centre of gravity of the entire moving mass lies as near as possible to the axis of rotation.

The machinery for operating the bascule span consists of two electric hoists, one at each side of the brdige. Each hoist consists of a spiral grooved drum, operated through a train of gears by a No. 76 Westinghouse railway-type motor. Each hoisting motor is

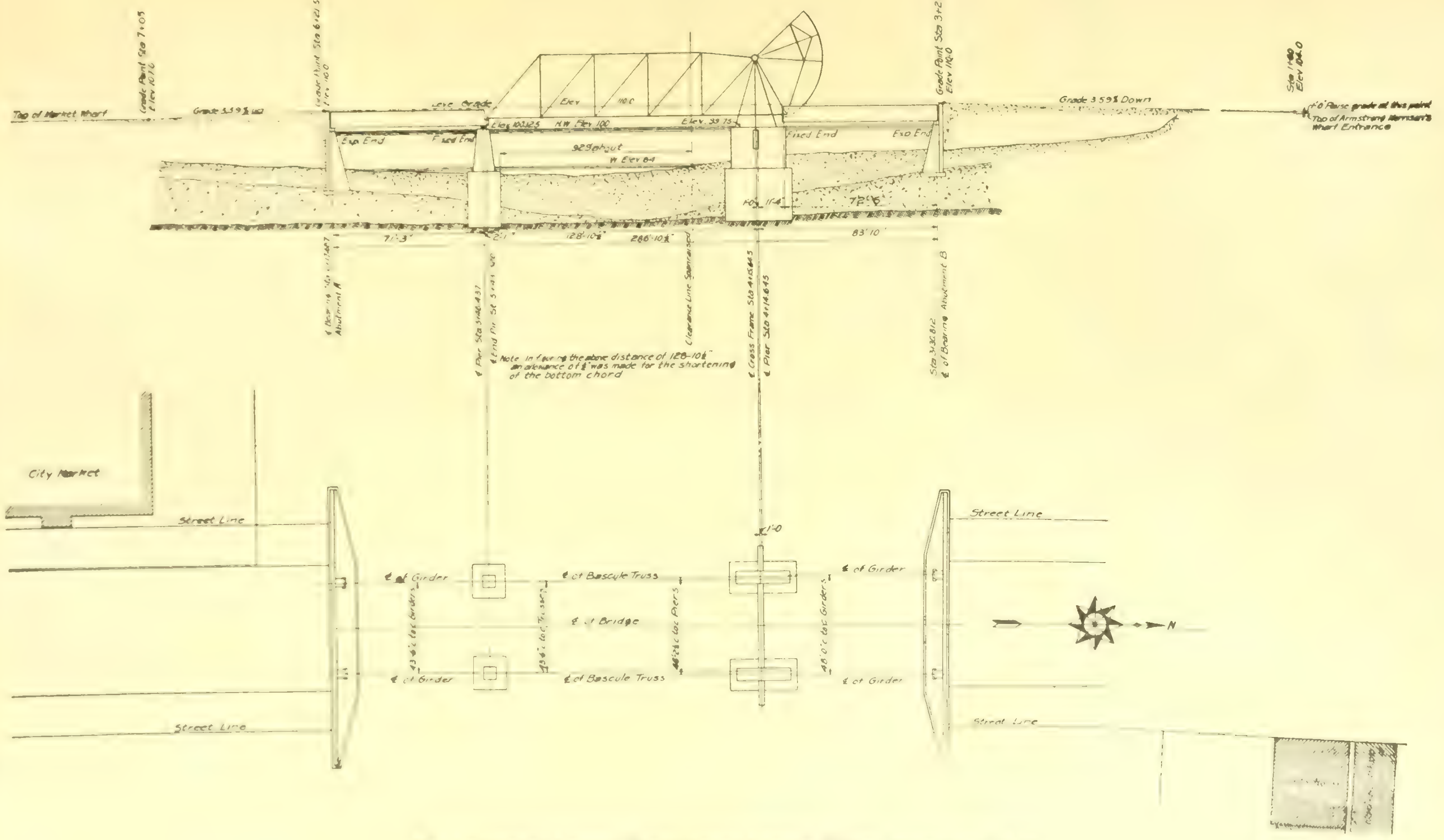


Fig. 1—General Layout Westminster Avenue Bridge, Vancouver, B.C.

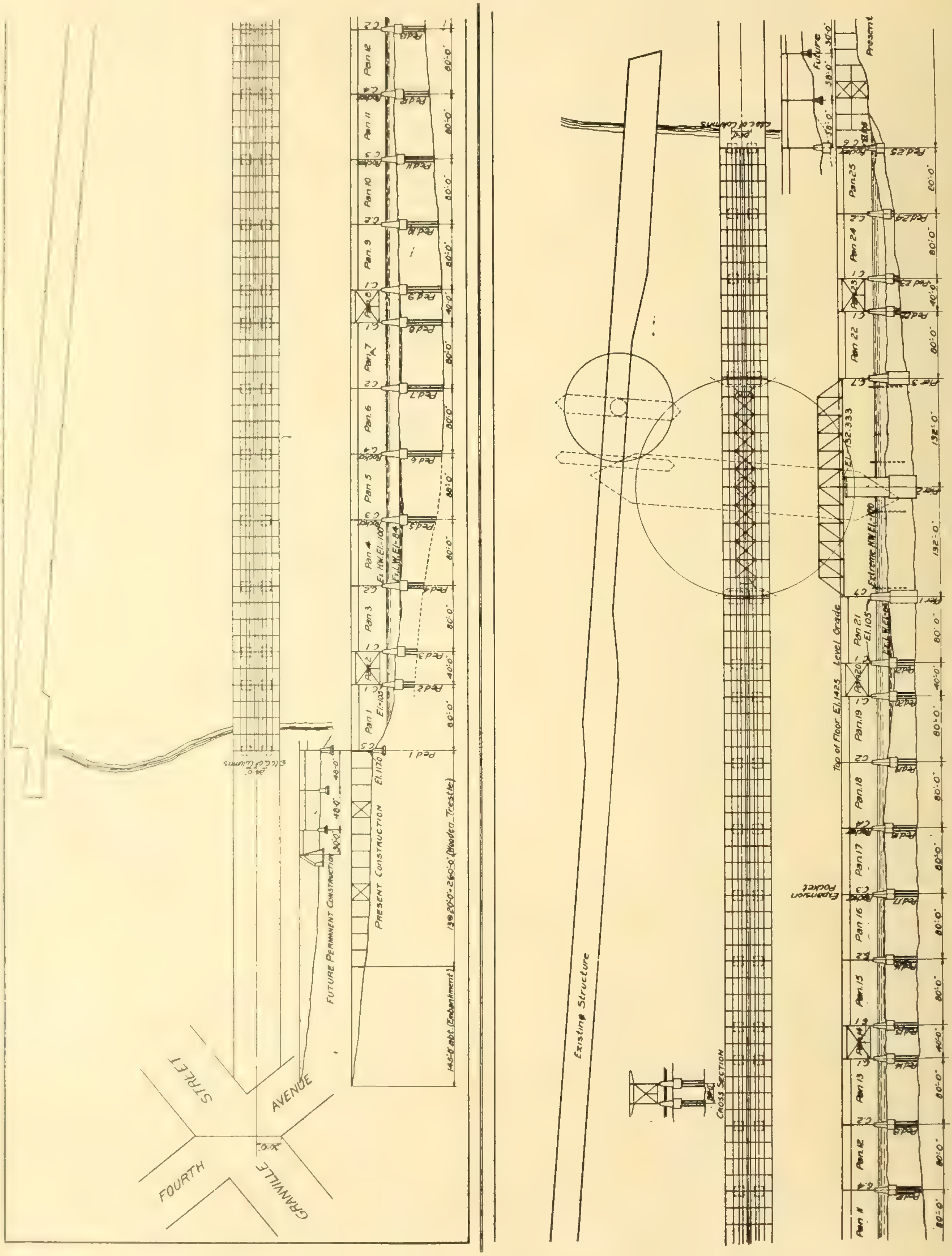
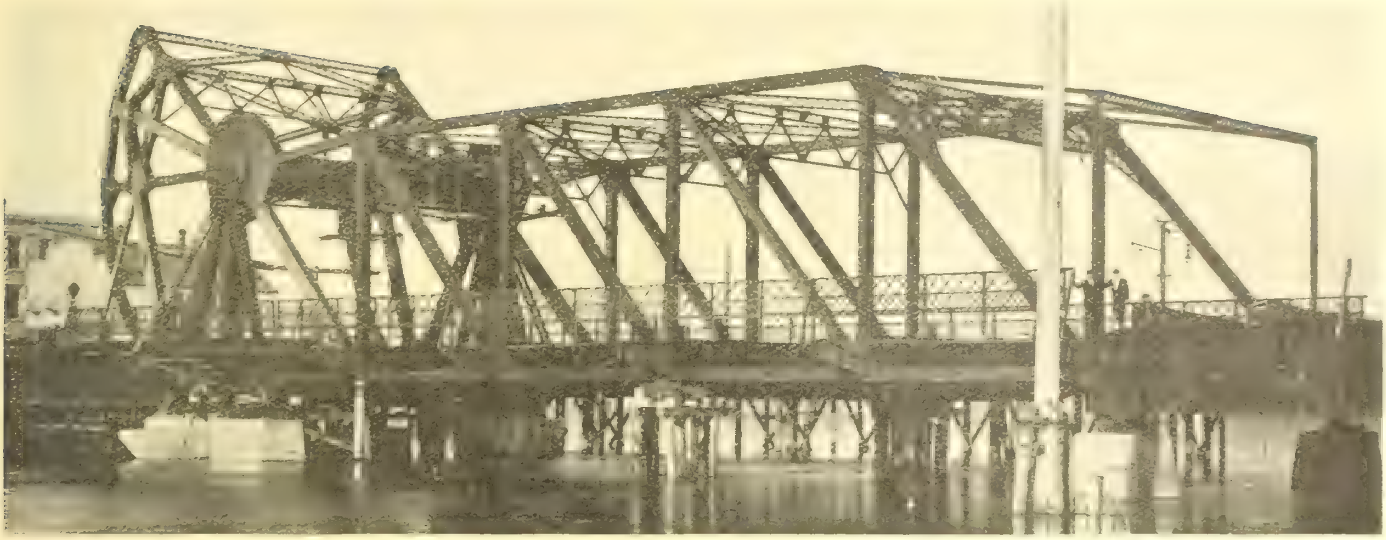


Fig. 2—General Layout Granville Street Bridge, Vancouver, B. C.



Westminster Avenue Bridge, Vancouver, B.C.

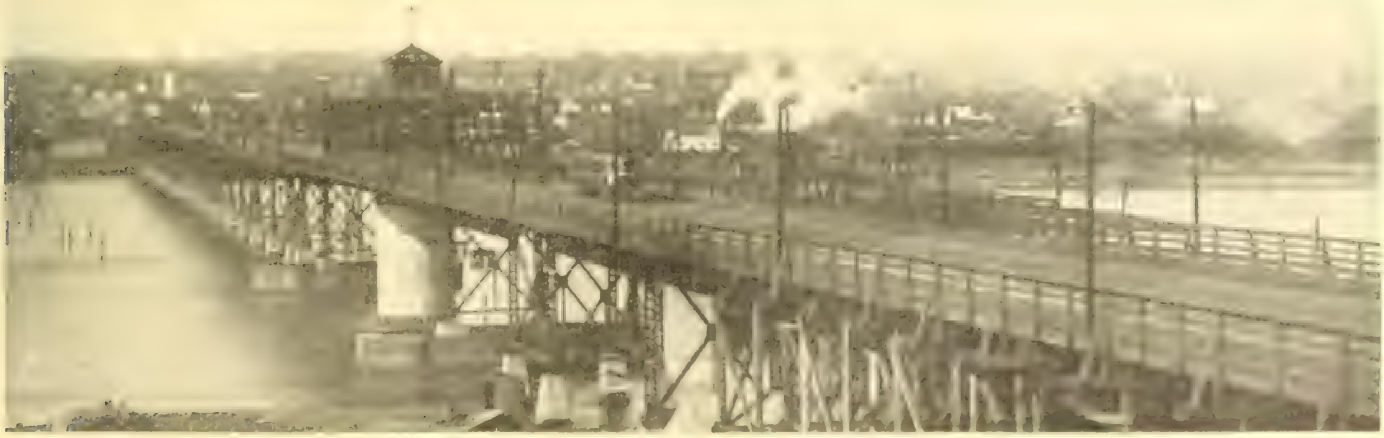
equipped with a solenoid brake, and the secondary shafts of the two hoists are connected by a steel shaft. Two pairs of one-and-a-quarter inch plow-steel wire ropes lead from each drum over a four-grooved pulley situated close to the heel of the bascule truss, one pair being connected to the upper end and the other pair to the lower end of the bascule truss arc. Each pair of ropes is so connected to a lever attached to the truss that the stress will always be equally divided between them; and each rope is so connected to the drum that any stretch or variation in the length of the rope may be adjusted. The curved members on the rear of each truss are composed of 18-inch I-beams, and the operating ropes lie between the flanges of these beams.

On the approaches at each end of the bascule span there is a counter-weighted portcullis that is to be raised and lowered vertically by a 3¼ horsepower, type K, Westinghouse motor, placed beneath the floor of the approach span. The motors at the lifting end of the bascule also operate a latch and hold the bascule span in position while it is in service.

All the motors are wound for five hundred volts, direct current. The motors which operate the hoists, connected in series parallel, are controlled by a standard street-railway-type controller, placed on the level of the sidewalk near the support of the bascule axle; each motor is provided with an automatically operated switch which throws off the current as the bascule span approaches the end of its movement in either direction. The motors operating the portcullises are operated by starting boxes placed beneath the controller.

The Granville Street Bridge consists of a 264 foot through swing-span over the deepest water, and steel trestle at each side, the total length of the steel structure being 2,064 feet. At each end of the steel work there is a timber trestle on piles, the total length of these two trestles being 690 feet. At the outer end of each trestle is an earth embankment upheld at its inner end by log cribbing. The total length of the bridge is 3,290 feet. The width of the structure is 56 feet over all, consisting of a forty-two foot roadway with a double track electric railway in the middle and a seven-foot sidewalk on each side. The steel trestle consists of twenty deck, plate-girder spans each eighty feet long; and five deck, plate-girder, tower spans each forty feet long, as shown in Fig. 2. The girders are supported on steel bents and towers resting on concrete pedestals, which, in turn, rest on pile foundations having their tops encased with concrete contained in boxes built of 12-in. x 12-in. timbers. The swing span, which is 37 feet above extreme high water, rests on a concrete pivot pier, supported by a pneumatic caisson sunk to bed rock.

The diameter of the drum is 26 feet, and that of the shaft under coping 30 feet. This span is supported at each end by a steel bent, resting on two pedestals



Granville Street Bridge, Vancouver, B.C.

built on pneumatic caissons that, on account of the possibility of future dredging, were sunk deep into a mass of concreted gravel and boulders. The smallest square caisson that could be handled was 16 feet, which permitted a base 10 feet x 10 feet. The height of shaft of pedestals is 23 feet; average height of crib and caisson 30 feet; and each pedestal is 7 ft. x 7 ft. on top. The draw protection is built of Australian hardwood piles, driven to refusal, and sway braced and sheathed with untreated Douglas fir.

The pavement consists of 4-in. creosoted blocks of Douglas fir, resting on 4-in. creosoted fir planks, supported by 6-in. x 9-in. ties, 30-in. centres, these in turn being supported by 4-in. shimming timbers bolted to the stringers. The pavement is crowned 4-in., being level for five feet in the centre.

The stringers used in this bridge are of "Bethlehem Special" section, as in the Westminster avenue bridge.

The length of the columns in the bents supporting the steel trestle is about thirty-six feet, and they are spaced twenty-four feet centres, the longitudinal and transverse sway bracing consisting of four-angled, laced I-struts. There are three expansion points provided, necessitating six sliding pockets.

The swing span is of the centre bearing type with rivetted Pratt trusses, thirty feet deep, spaced twenty-four feet centres. The cross girders and stringers are similar to those in the steel trestle. The span is operated by a No. 12A, railway-type, Westinghouse electric motor, wound for five hundred volts direct current. The machinery is located in a house on top of the span at mid-height.

In designing this structure, the live load used was Class B. of De Pontibus, for the roadway, and Class C. of same for the sidewalks; and in addition the double track electric railway load of two coupled cars on each track for stringers and floor beams, and one car on each track for girders and columns. The electric cars are each 47 feet long over all, and their weight when loaded was taken as 74,000 lbs. each. The wheel spacing used was 5 ft.; 27 ft.; 5 ft., leaving five feet of projection at each end of car. In addition to the above, a road roller of Class A. (De Pontibus) was used in figuring roadway members, the impact being neglected in the secondary members. Both bridges were designed by Waddell & Harrington, Consulting Engineers, Kansas City, Missouri, who also supervised the erection of the entire structure. The contractors for the substructure were Messrs. Armstrong, Morrison & Company, Vancouver, B.C., who also did the assembling and erecting of the superstructure, which was fabricated by the Dominion Bridge Company, of Montreal. Work was begun on the site by the substructure contractors in May, 1908. The temporary structure at Westminster avenue was first completed, and work was then begun on the approaches and foundations of both bridges. The first steel was erected on the Granville street bridge in December, 1908. Owing to the great length of this bridge, both the substructure and superstructure work were carried on simultaneously, the substructure being practically completed in June, 1909. The bridge was formally opened in the following September. Owing to the short length of the Westminster avenue bridge, however, it was considered advisable for the superstructure contractor to await the completion of the piers and embankments before attempting to start erection. The first steel was erected in April, 1909, and the structure was practically completed by the end of the year.

The following is a list of unit prices paid to the contractors:

Mass in place of cribs and caissons of pneumatic piers, $17.50 per cubic yard.

Mass in place of bases of pile piers and pedestals, $13.50 per cubic yard.

Shafts of all concrete piers, pedestals, and abutments, $10.90 per cubic yard.

Anchor bolts and their details in place, 6½c. per lb.

Foundation piles projecting below concrete bases, 32c. per lin. ft.

Rock in place in walls of earth embankment, $2.25 per cubic yard.

Earth embankments, 75c. per cubic yard.

Timber in place in temporary bridge, including cost of metal, $25 per M. ft. B. M.

Piles in place in temporary bridge, 20c. per lin. ft.

Untreated timber in place in trestle approaches, $29 per M. ft. B.M.

Creosoted plank in place in trestle approaches, $50.-65 per M. ft. B.M.

Pavement of trestle approaches, $1.98 per sq. yd.

Metal in plate-girder spans, erected, 4.69c. per lb.

Metal in bascule span, erected, 7.44c. per lb.

Metal in draw span, erected, 6.48c. per lb.

The total cost of the Westminster avenue substructure was $87,916.28, and that of the superstructure $106,729.27. The cost of the bascule span superstructure and substructure was $112,125.60, of which the steel in the spans amounted to $62,810.

In the Granville street bridge the final estimate of the cost of superstructure was $305,384.89, and that of the substructure $146,098.28. The total quantity of steel in the Granville street bridge is 2,421 tons, of which 458 tons are in the draw span. The total weight of the Westminster avenue superstructure is 629 tons, including 422 tons in the bascule span. The substructure of this bridge contains 3,060 cubic yards of concrete, and that of the Granville street bridge 7,230 cubic yards.

The Granville street bridge was formally opened by Earl Gray, Governor-General of Canada, on September 6, 1909, on which occasion many high compliments were paid to the designers and contractors of this important structure.

With nearly 26 miles of street paving contracts already passed, and a large accumulation of unfinished local improvements awaiting attention, the city council of Victoria is considering a halt until the contractors have caught up.

An Introduction

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Market Street Bridge and Approach, Brantford, Ont.

The Market Street Bridge, Brantford, Ont.

Monolithic Structure of Four Reinforced Concrete Girder Spans and One Arch—One of the Largest Bridges of this Type

The above bridge was built during the summer and fall of 1910 by the city of Brantford, Ont. It was designed to carry the traffic of one of the principal business streets of the city across the Grand Trunk Railway Company's tracks, and across the tracks of the Brantford and Hamilton Electric Railway Company; also over a canal, owned by the Western Counties Electric Company, which is used for power purposes. The Brantford Street Railway Company have a single track line laid over the bridge.

The Market street bridge is a monolithic structure consisting of four reinforced concrete girder spans of from 36 ft. to 46 ft. each, and one reinforced concrete arch of 60 ft. span, the length over all being 245 ft. 9 ins. The width of the roadway is 40 ft. 3 ins. from curb to curb. The sidewalks on each side have a clear width of 10 ft. 3 ins. each. Concrete balustrades bring the total width of the bridge up to 64 ft. over all.

Girders were used over the railway tracks as it was found that arch spans would not give the necessary clearance to accommodate the traffic beneath.

In general construction the street railway track and asphalt block pavement are supported by a six-inch reinforced concrete slab carried on 18 in. x 42 in. reinforced concrete girders, spaced 5 ft. 9 ins. centre to centre. They are designed to act as Tee beams in conjunction with the floor slab. Supporting the girders are square concrete columns, 20 in. x 20 in. at the neck and 24 in. x 24 in. at the base. They are placed on a pedestal wall which carries the load to the footings.

Over the arch, the pavement and tracks are carried on a similar reinforced floor slab, supported on transverse spandrel walls which carry the load to the arch ring. The arch ring rests on plain concrete abutments.

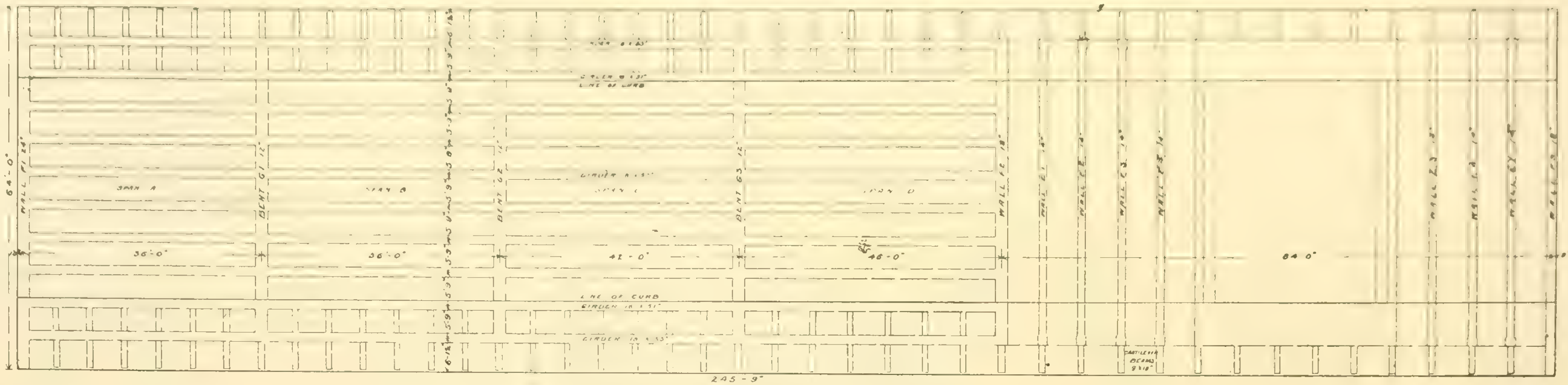
The reinforcement in the floor slab consists of ½-in. deformed bars, spaced 10-in. centres. The girders are reinforced with Kahn trussed bars in cross section, varying with the length of the span. The reinforcement in each column consists of four 1-in. square deformed bars, one at each corner, tied together at 20-in. intervals with ⅜-in. round steel. The reinforcement in pedestal wall consists of ½-in. bars spaced 18-in. centres both ways. The arch ring is reinforced with 1-in. square deformed bars at intrados and extrados spaced 14-in. centres, except for a distance of 7 ft. from each soffit, when they are spaced 9-in. centres.

One half the width of the sidewalks for the whole length of the bridge overhangs the supports and is carried by reinforced cantilever beams, which are tied back into the main girders over the girder section of the bridge, and into the spandrel walls over the arch section, by means of two Kahn trussed bars placed in the upper section of the beams.

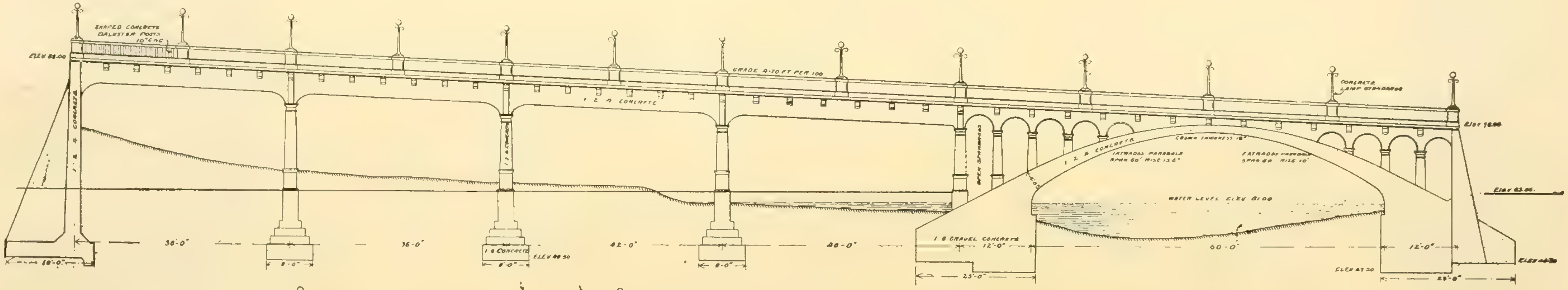
Wall F1 is designed to take the full thrust of the earth backing, without assistance from the superstructure of the bridge. Six reinforced revetment walls, 18-in. thick, tie the face wall to the bottom slab. This slab is reinforced with 1-in. square deformed bars placed close to the under side, and the face wall is reinforced in the same manner, with bars placed close to its outer surface.

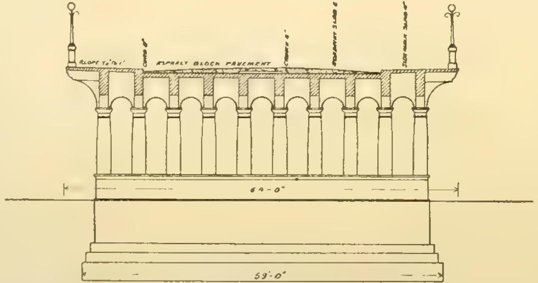
The footings of Bents G1, G2 and G3 are of plain

Water Span, Market Street Bridge, Brantford, Ont.



Plan, Showing arrangement of Floor Supports





Elevation of Bent

REINFORCED CONCRETE BRIDGE

FOR

SOUTH MARKET STREET

CITY OF BRANTFORD

concrete, as are also the arch abutments and wing walls.

The footings were carried down to a firm stratum of red clay about 10 ft. in thickness overlaying the rock. In the calculations, a pressure of two tons per square foot was allowed on the foundation soil.

The concrete used throughout the construction was made from gravel obtained near the site of the bridge. For heavy mass work in the footings, arch abutments, and wing walls, it was used just as it came from the pit, in the proportion of 6 to 1. For the walls, columns, girders and arch ring it was run through a rock crusher and screen. The proportions for the work were 1:2:4, the coarse aggregate ranging in size from ¼ in. to 1¼ in. For the floor slab and balustrades the proportions were kept the same, but the size was reduced to ¾ in.

There are about 4,000 cu. yds. of concrete and 100 tons of steel in the bridge. The cost complete with pavement and electric lighting fixtures, was about $50,000.

Constructional View of Market Street Bridge
Brantford, Ont.

The bridge was designed under the supervision of the City Engineer, Mr. T. Harry Jones, by Mr. Frank P. Adams, assistant city engineer. The construction was supervised by Mr. Arthur O. Secord. The contractors were Messrs. J. Y. Harper & Son, of St. Thomas, Ont. The reinforcement throughout was supplied by the Trussed Concrete Steel Company, and the cement used was the "Blue Lake" brand, manufactured by the Ontario Portland Cement Company.

Paint Coatings for Concrete

The use of cement concrete for structural purposes has already become world-wide, and it is increasing at a rapid rate. Heretofore little attention has been paid to coatings for concrete. Enough time has now elapsed to show that cement concrete alone is not as durable as might be wished partly because the cement either contains free lime or develops free lime within itself, after setting. Furthermore, concrete in order to compete with other structural materials has had to be economically handled and roughly finished, and its resulting unsightly appearance has detracted from its desirability. It is therefore clear that there is great necessity for both protective and decorative coatings for concrete. The problem of waterproofing concrete is being studied from several standpoints besides that of applying protective coating. For instance, the endeavor to reduce the voids in concrete to a minimum, as well as to obtain uniformly fine ground cement and to eliminate the tendency of the cement to form free lime in setting, are all absolutely necessary steps in the production of a waterproof concrete and are the special business of the cement manufacturer and engineer of construction to work out.

Much experimental work is under way with regard to waterproofing concrete by means of the addition of various foreign substances in small quantities to the aggregate. Some of these materials are of mineral composition and others are organic. Many compounds are now on the market, but the composition of most of them is not published. Some analyses have been made recently on a series of compounds widely advertised for use in waterproofing, strengthening, or decorating concrete. Among the materials contained were stearic acid compounds, gums, waxes, soaps, mineral chlorides, inert pigments, and asphalte derivatives. Much interesting information is given regarding the composition of such compounds, although the names of the particular compounds are not given. The possibility of ultimate deleterious effects on concrete from the use of these internal waterproofing materials is a subject for joint study by engineers and paint chemists. In addition to proving the advantages of such materials as water excluders, it should be determined whether they may corrode the steel used in reinforcing concrete or whether they may effect the set and tensile strength of the cement itself.

It is particularly the province of the paint chemists to study the subject of paint coatings for concrete. Oil coatings have been found to be badly affected by the free lime present, which causes saponification and subsequent solution of the saponified coating. The porosity of cement or concrete surfaces causes an absorption or suction effect that renders it necessary to apply to a given area three or four times as much paint as would cover an equivalent area of wood. Two very important lines of investigation are therefore suggested—the neutralization of the free lime in the cement and concrete and the proper filling and treatment of the pores of the concrete—in order to prevent the suction of any paint that may be applied later.

Two trackless trolley lines, according to a report in the London Times, have been recently built in Bremen. The cars resemble motor omnibusses. Two trolley wires are used, one above another, about 8 inches apart. The trolley, or collector, has two rollers running on the upper wire and two bows on the lower. The wires from the collector to the car coil or uncoil automatically on a drum in the car so as to permit it to turn out for other vehicles.

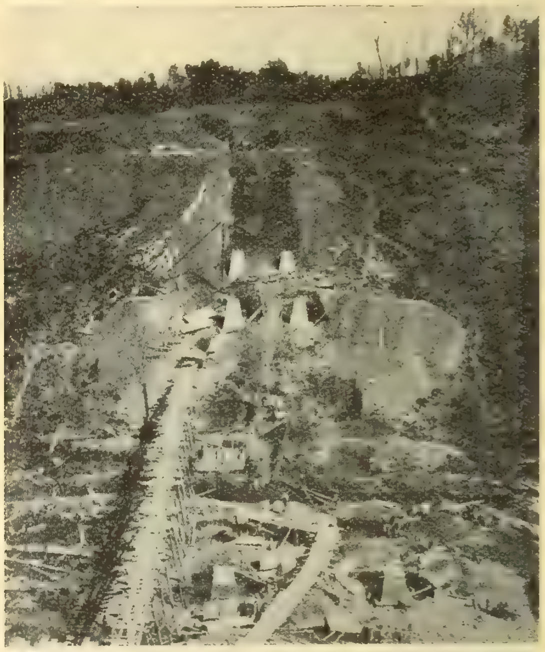
The Minister of Railways, Hon. G. P. Graham, confirms the report of the resignation of Mr. H. E. Vautelet from the Quebec Bridge Commission. For some time past Mr. Vautelet has not been enjoying the best of health and he had previously intimated his intention of resigning when the bridge plan was accepted.

Bridge Construction in New Brunswick

Difficulties Encountered on the Graham Brook Viaduct—Methods Employed by the Contractors—The International Bridge, another Interesting Contract

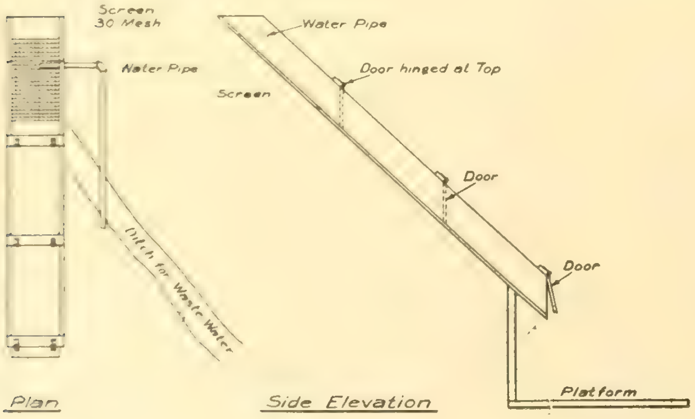
On July 13th last we published an article dealing with some of the concrete work on the National Transcontinental Railway executed by Messrs. Powers & Brewer. The article contained views of the Little River, Salmon River and Caton Brook viaducts. Herewith are shown views of the Graham Brook viaduct on the same contract. The work consists of two abutments and twenty pedestals. The amount of concrete placed in this viaduct was not large, but the work is interesting owing to the difficulty of execution, caused by the nature of the ground. The viaduct is 500 feet long, and the distance from base of rail to water is 160 feet. The flat was very swampy, and machinery and material had to be hauled on the high ground at each end of the viaduct and taken down the steep hills.

Graham Brook Viaduct, Transcontinental Railway, Looking East



Graham Brook Viaduct, Transcontinental Railway, Looking West

Gravel of good quality, but containing loam, was found about two miles away and landed on the east side, as shown on the right of the first picture. A long box with an open top was constructed, with three doors hinged at the top of box and with about eight feet of wire screen, 30 mesh to the inch, as part of the bottom. The gravel was shoveled into this box and as it passed the screen a 1¼-in. stream of water was sprayed on it, pumped from the brook below by a steam pump. The loam was washed through the screen and the waste water carried off in a ditch below the trough. The hinged doors prevented the coarse gravel from becoming separated from the sand. Excellent results were obtained.



Details of Washing Plant

The mixing was started by hand but after a few days a No. 1 Smith mixer was used. The concrete was taken across the flat on a trestle, 30 ft. high, in bottom dumping buckets and placed in the pedestals by means of derricks, operated by steam.

A view is also shown of the International Bridge between Van Buren, Maine, and St. Leonards, N.B., built by Messrs. Powers & Brewer. Excavation was started on September 23rd and the bridge was completed in 52 days. Gravel obtained along the river banks was used for the concrete. The work consists of one wing abutment, one U abutment and three piers. Three of the spans will be 145 feet and one 326 feet. The foundations were carried to a depth of about 8 feet below the river bed, through gravel and blue clay, and a good bottom was reached. Sheet piling, 6 inches thick, was driven ten feet below the foundations and the piers were riprapped to prevent scour. Vulcan cement was used, and the concrete was mixed in three Smith mixers.

Coke Breeze Concrete Commended

Coke breeze as an aggregate is thought by many to be beneath notice, says Mr. Thomas Potter, M.C.I., in a paper read before the Concrete Institute. It was extensively used for many years, principally for floors, but undeservedly lost its character some time ago through a letter in the Times telling of its failure in Germany, where it had been prohibited. It was not stated of what class of coal it formed the residue, and this is an important point. Some to be seen in Scotland is quite unfit for concrete purposes, but in England this is not found. The letter referred to was followed by others saying it was so inflammable that, if exposed to a severe fire, it was second only to coal in assisting combustion.

International Bridge between Van Buren, Me., and St. Leonards, N.B.

So far as its strength is concerned, Mr. Kirkaldy made some experiments for the West Ham Corporation some years ago with the following result: A brick pier, 18 in. square and 18 in. in height, made with best stock bricks and blue lias lime mortar, crushed at the end of two years with 46 tons per square foot; a similar pier of Harold wood bricks and blue lias lime mortar crushed with 75 tons per square foot; another pier made of six parts of coke breeze to one part of Portland cement crushed with 131 tons per square foot.

As to inflammability, the tests made by the British Fire Prevention Committee with various kinds of floors, each under similar conditions, exposed for three hours to an increasing and ultimate temperature of 1,900 deg. F., and water played on them from a hose pipe, gave the following results: Coke breeze and burnt ballast equal and best; each was found, after being allowed to cool, practically free from cracks or deflection; and Thames ballast and granite chips the worst.

Mr. Potter stated that he had used some thousands of tons of coke breeze for floors, and did not remember a failure of any kind. He was aware that coke breeze is condemned by many as an unsuitable aggregate, but spoke from his own experience; and although it is not, taken altogether, the best material for floors and roofs, it has proved to be one of the best.

Reinforced Concrete Piles

Mr. H. J. F. Gourley read a paper before the Manchester students' section of the Institution of Civil Engineers recently on "Concrete and Reinforced Concrete Piles." Mr. Gourlay said that to obtain wooden piles of a standard quality had been an increasing difficulty during late years, and it was necessary, therefore, to find materials which were at least as strong and economical as wood. The use of concrete, and recently of reinforced concrete, had become more extended and varied as the knowledge of their properties had increased, and it seemed quite natural that the question of their suitability for piling should have engaged the attention of engineers anxious to find an efficient substitute for wood. Apart from the difficulty of obtaining timber piles of a uniform quality, wooden piles might also be defective, though apparently sound, judging by their external appearance. With thorough supervision and the use of properly graded materials, there should not be any difficulty in securing perfect uniformity and soundness in concrete and reinforced-concrete piles. The load placed upon an average wooden pile might be taken at 15 tons, but on concrete piles an average load was 40 tons or more. The wooden pile, again, must always be wet. If this condition obtained the life of the pile was long, but should the pile be subjected to the partially wet and partially dry state, deterioration soon set in, and its life was short. There was no such risk where concrete piles were used.

Sewer System of the City of Winnipeg

General Principles and Features of Design—Sewer Barrels, Manholes and Catch Basins of Concrete—Cost of Labor and Material

Specially Contributed by W. Aldridge, City Engineer's Department, Winnipeg

For sewer purposes Winnipeg is divided into twenty districts, each having a distinct system of sewers discharging through a separate outlet into one or other of the two rivers at whose junction the city is situated. Into the Assiniboine there are, or will be, eight outlets, and into the Red River twelve outlets. There are also three secondary outlets—one at the west end of River avenue, one at Water street, and one at Boyle street, draining small sub-districts which have been cut off from the main sewer district to which they belong by railway construction or other cause. Besides, there is a second outlet at Bannatyne avenue, this being the first sewer built in the city. It takes care of the drainage of a small area including a large portion of the business districts. There is also a sewer discharging at the foot of Lombard avenue which relieves the old sewers last mentioned in time of excessive storms.

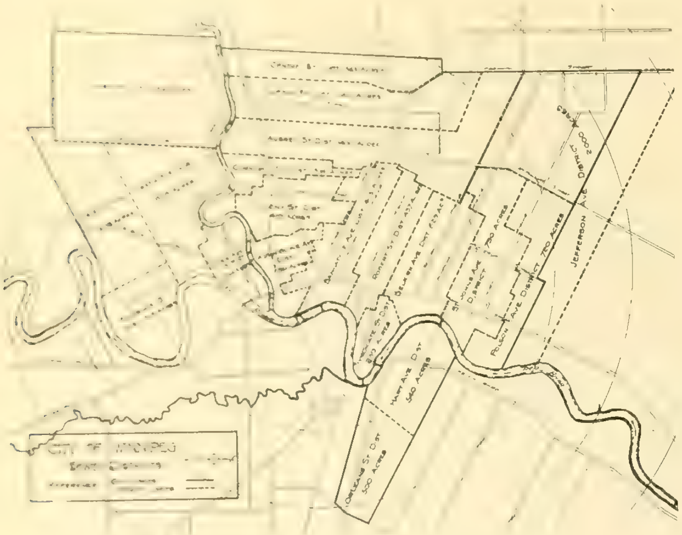


Fig. 1.—General Layout of Sewer Districts.

The main districts are shown with approximate areas on Fig. 1. Three of the outfall sewers, Ash street, Centre street and Jefferson avenue, have not yet been constructed, but it is the city's intention to build them during the present year. The areas of the various districts are shown on the map. It will be seen that the total area within the city limits is provided for, together with about 1,000 acres north of the city, which will be taken care of by the proposed Jefferson avenue outlet, making a total of 15,000 acres provided for.

Our sewers are all combined sewers and most have been designed by the use of Adams' formula for a maximum rainfall of 1 inch in an hour, one-half running off; and it is found that this fits local conditions as well as if it had been evolved from them. It is possible, however, that this is due to the long narrow form of the districts, which increases the time of concentration, thus giving time for the lower reaches to clear before the storm water from the upper end comes down. The old wooden sewer in the business district, which discharges at the foot of Bannatyne avenue drains a district which is rapidly becoming closely built up and paved, and which is all concentrated about the outlet. This sewer has occasionally been heavily taxed, therefore, and it was for this reason the Lombard sewer was constructed. So that though the old formula is still in use it is now checked by the more rigorous method, taking into account time of concentration, percentage of pervious and impervious surface, rainfall, etc. We are miserably deficient, however, in satisfactory rainfall records.

The city varies from 30 to 36 feet above low water in the rivers and is therefore practically level. As a consequence our sewers are about 30 feet deep at the outlet, gradually rising to a depth of 10 feet at flush

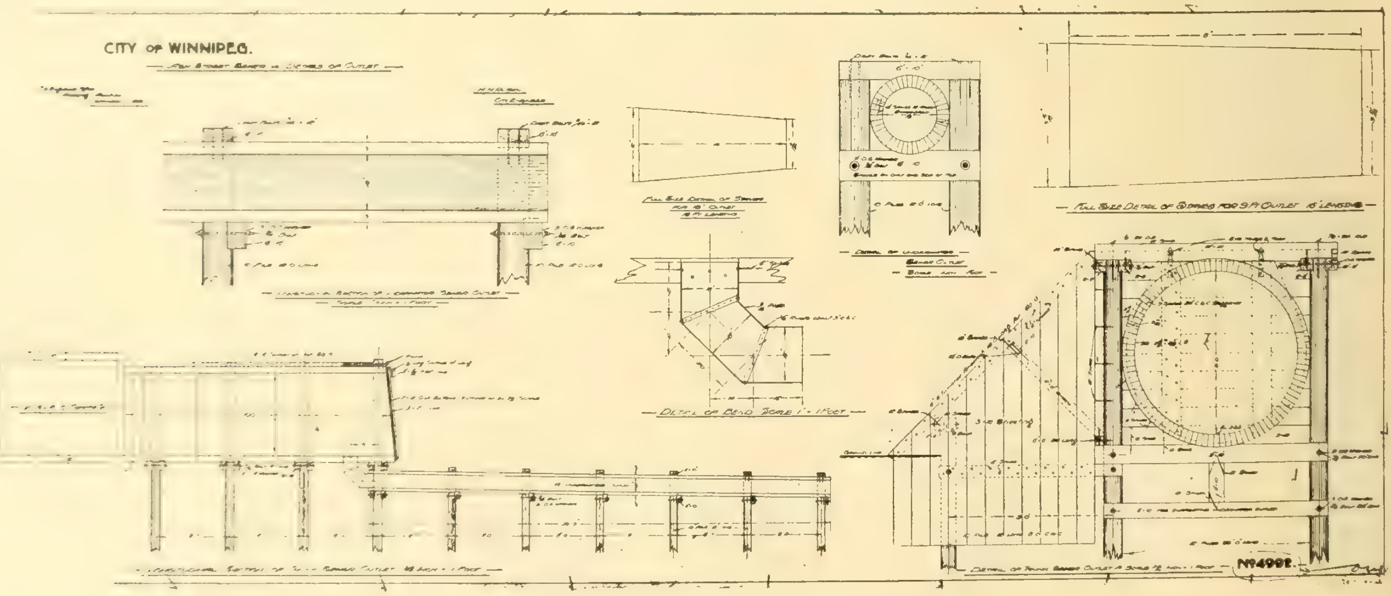


Fig. 6,—Sewer Outlet Detail.

tanks, the grades not being affected materially by surface contour. The trunk sewers are generally located about the middle of the district, as this decreases the size and depth—and therefore the cost—of sub-mains, and for the same reason the sub-mains are now generally placed in the middle of their sub-districts.

The laterals are made of 12-in., 15-in. and 18-in. vitrified pipe. The sub-mains and trunk sewers, from 2 feet in diameter up, are now all built of concrete, though some of the older sewers were of brick, and the earliest mentioned above of wood.

The sewers are designed to give a minimum velocity of 3 ft. per second, running full. Manholes are placed at all intersections and changes of alignment, and in long blocks from 300 to 500 feet apart, depending on size of sewer. Flush tanks, averaging 262 gallons capacity, are placed at all summits. This is necessary on account of long periods, especially in winter, when no storm water enters the sewer.

Our sewer outlets, from a point well in the river bank to the outfall end, are constructed of wood and are circular in form. The outer end is three or four feet above low water and is closed by a wooden door, hung from the top, which floats on the stream when running full. The main barrel is tapped about 10 feet from the end by a smaller pipe also constructed of wood, except for the bend at the junction. This small outlet extends 50 feet or more beyond the end of the main outlet. It takes the dry weather flow well out into the stream in times of low water. The main sewer barrel, from the point where it leaves the bank, to the end, is supported on piles and is protected, on the upstream side, from the spring ice-flow by a sloping ice break, constructed of 6 x 6 timber, laid so as to carry the ice over the outlet.

The sewer barrel beyond the wooden outlet is built of concrete. All sewers larger than 3 ft. are built egg-shaped, of the form shown in figure 3. The thickness of wall is the same all round, the standard thickness being as follows:

Short diameter of sewer. Feet	Thickness of wall. Inches
2' 0" to 3' 0"	4"
3' 0" to 4' 5"	6"
4' 5" to 6' 0"	8"
6' 0" to 8' 0"	10"

and so on.

Manholes are built of concrete rings 2ft. 6 in. in diameter, 4 in. thick and 12 in. high, except the four bottom rings on laterals. On these small sewers the four bottom rings are 6 in. thick and the three lowest are split in half. Between the two halves are insertad concrete blocks 6 in., 12 in. and 18 in. respectively, so that the manhole lengthens along the line of the sewer. This is shown clearly in figure of manhole. The covers are of the open grate type to provide ventilation.

The flush tanks are built of concrete, of the form shown in figure 5, with a short manhole shaft above. The siphon, which is automatic, is the invention of the City Engineer, Col. H. N. Ruttan.

The catch basins are built of concrete rings, similarly to manholes, and are 8 feet deep. They are connected to the sewer by 9-inch vitrified pipe connections provided with a hood trap at the catch basin end. They have closed covers. House connections are made of 6 in. vitrified sewer pipe. The sewers are ventilated through open manhole grates. A few years ago the use of the house trap was made optional with a view to improving the ventilation. Various experiments have been made, mostly by private parties with council's permission, to deodorize the sewer air as it escaped at the manholes, or by means of gas jets at the top of standpipes to burn it, with more or less success.

The sewers are constructed by contract or day labor, according as the figure of the City Construction Engineer is above or below the lowest bid received.

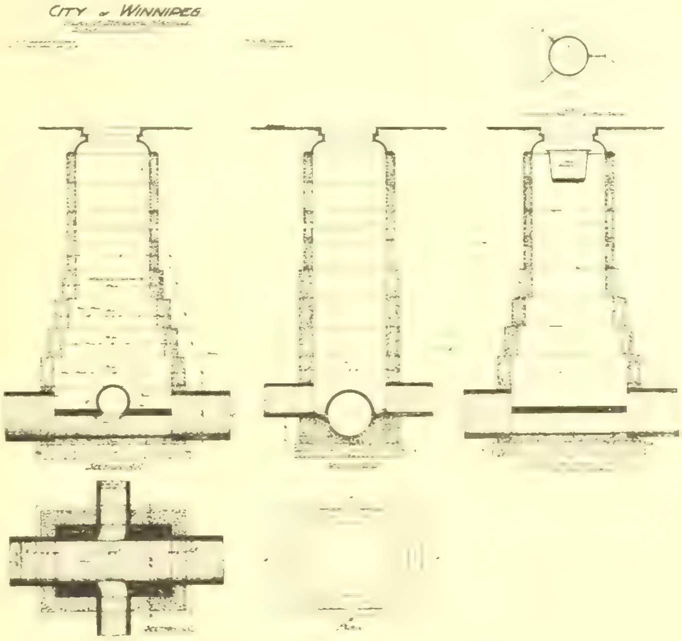


Fig. 2.—Standard Manhole.

The ground consists of clay. There is no rock met with except an occasional boulder. In a few places quick-sand is found near rivers. The trenches usually require timbering.

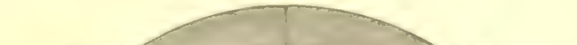


Fig. 3.—Egg Shaped Sewer used by City of Winnipeg.

The city owns three Carson bucket trench machines. In one the buckets are carried on a cable and in the other two on a trestle made of A-shaped bents. These machines are used in the construction of large-sized sewers.

The work is done winter or summer. The cost of winter work has been greatly reduced by the use of the Hurst frost-breaker, a machine devised by W. Hurst, late sewer foreman for the city. It consists of a chisel attached to a pile driver head which chops off huge lumps of earth down to the frost line which are lifted out of the trench by a derrick, also part of the machine. This machine is used on the wide trenches only. The cost of excavating the frost layer is reduced from $1.50 per cubic yard by ordinary picks and shovels to 20c. to 30c. by use of the machine. The excavation for laterals is done by hand.

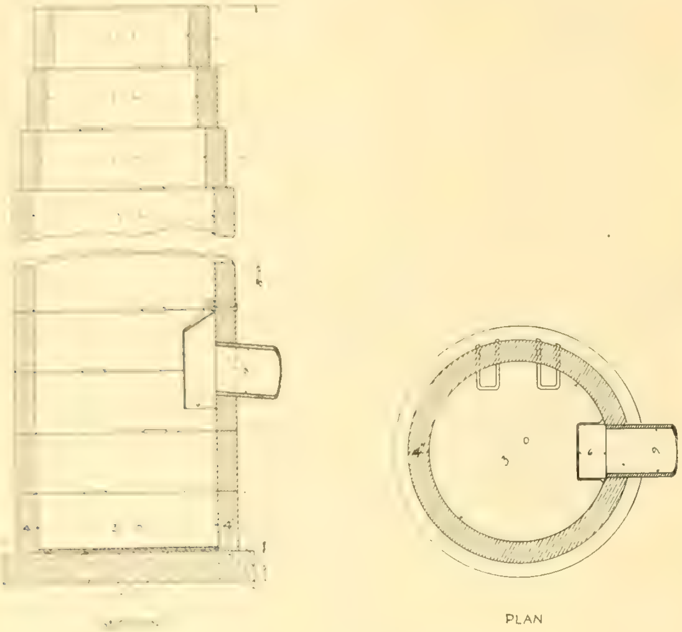


Fig. 4.—Standard Catch Basin.

Concrete for sewer barrel is mixed by machine and deposited by means of chutes, except of course, in tunnel work, where the concrete is hauled from machine to the shaft, lowered in barrows and wheeled to end of tunnel to be deposited by hand. The concrete rings for manholes and catch basins are moulded at the city yard and delivered to job when required.

On contract work the city supplies vitrified sewer pipe on the job, all other material and plant being supplied by the contractor.

Costs.

The city pays the following prices for vitrified salt glazed sewer pipe delivered on the job:

9-in.—23c. to 25c. per lin. foot.
12-in.—38c. to 40c. per lin. foot.
15-in.—55c. to 60c. per lin. foot.
18-in.—85c. to 90c. per lin. foot.

Junction pipes for 12-in., $1.40 to $1.50 each (2-ft. long.)

Junction pipes for 15-in., $1.80 to $2.00 each (2-ft. long.)

Junction pipes for 18-in., $2.50 to $2.75 each (2-ft. long.)

The costs of sewers, based on the bids of successful tenderers, are approximately as follows:

12-in., $1.10 to $1.40 per lin. foot, for depth from 10 ft. to 14 ft.

15-in., $1.60 to $1.75 per lin. foot, for depth from 12 ft. to 16 ft.

18-in., $2.10 to $2.35 per lin. foot, for depth from 14 ft. to 18 ft.

The above prices are made up of average of successful bids, plus cost of pipe which the city supplies to the contractor, and 10 per cent. to cover inspection, engineering, office expenses, etc.

Catch basins complete with 9-in. pipe connection to sewer—16 ft. long—cost $48, and manholes cost about $6 per foot of shaft, including castings. Flush tanks cost $130 each.

The cost of concrete in large sewers is about $7 a cubic yard in open trench work, and in tunnel work $9.50. Excavating with the Carson trench machine, trenches 20 to 30 feet deep, averages 75c. per cubic yard. This, of course, includes refilling. Timbering such trenches, allowing that the timber may be used three times, between $1.25 and $2.00 per foot of trench. Excavation in tunnel costs about $1.50 per cubic yard and little or no timbering is required.

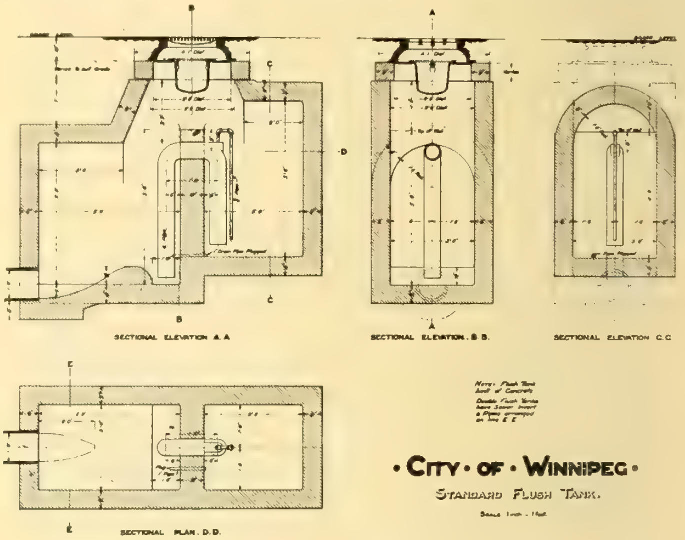


Fig. 5.—Standard Manhole and Flush Tank Combined

Cement cost on the job $1.90 per barel, sand and gravel $1.15 per cubic yard, and broken stone $1.85 per cubic yard on the job. Common labor was paid 20c. per hour; concrete men received 22½c. per hour.

Estimates for the current year's expenses and proposed work at Vancouver, B.C., recently passed by the Board of Works for that city, amount to nearly $700,000, an increase over last year of $250,000. Among the items are, street maintenance, $160,000; street cleaning, $75,000; street sprinkling, $10,350, including three additional wagons; new road roller, $7,000; portable rock crusher, $7,500; additional tools and maintenance, $10,000.

The first of two subaqueous rock crushers ordered by the Dominion Government for use in connection with dredging operation on the British Columbia coast will arrive on the Blue Funnel liner Ning Chow, and when put together by experts sent over for the purpose will be first employed in the harbor at Victoria, B.C. In appearance the crusher will resemble a large scow, fitted with a derrick similar to a pile-driver, from which is suspended by a cable a chisel of compressed steel weighing from 10 to 15 tons. The chisel fitted with a hard cutting point, is allowed to fall a distance of six to ten feet by its own weight on the surface of the rock, delivering blow after blow until a layer of rock three feet in thickness has been crushed, when the dredge scoops up the debris. The use of the crusher obviates all blasting and is said to be more thorough and economical.

Present Quarry Workings of Messrs. Doolittle & Wilcox, Limited

Recent Extensions to the Dundas Quarries

Description of the Modern Crushed Stone Plant Owned by Doolittle & Wilcox, Limited—Details of Operation and Equipment

During the past five years the demand for crushed stone of all sizes and for all purposes has increased enormously. This has been due in part to the increased activity in the good roads movement, the growth of the steel and iron industry, the wide application of concrete to all classes of structures and other similar contributing causes. To meet this increased demand for this product it has been necessary for the quarry operators to design and install plants capable of a greatly increased output. The design of these modern plants has been the subject of much careful study both in the United States and Canada, and the comparatively small number of them in operation at the present time has justified the expenditure involved in the installation.

Such a plant embodying the latest ideas in rock crushing and screening machinery and equipped with the best quarry machinery obtainable has just been completed by Doolittle & Wilcox, Limited, at their Dundas quarry. Owing to the many novel features in its layout, and the completeness and adaptability of the arrangement for meeting the demand of the trade, a detailed description of the plant will be of interest to our readers.

The workings are on the top of the limestone ridge running along the northern side of the Dundas valley and about a half mile from the Dundas station on the Grand Trunk Railway. The company's sidings come off the main line tracks at a point near the station and parallel the railroad at a grade of about one per cent. for a distance of about three-quarters of a mile. The brow of the mountain at this point is about 250 feet above the level of the Grand Trunk tracks, the rock on top being covered by a deposit of clay and loam to an average depth of about 10 ft. To get at the rock it is necessary to remove this material which is handled by electric shovels and wasted.

The deposit of rock is a very hard, close-grained dolomitic limestone, an average analysis of the top twenty feet running:

Carbonate of lime, 55.5 per cent.
Carbonate of magnesium, 43.5 per cent.
Silica, 0.5 per cent.
Aluminum and iron, 0.5 per cent.
The second forty feet runs about as follows:
Carbonate of lime, 52.5 per cent.
Carbonate of magnesium, 44.5 per cent.
Silica, 1.5 per cent.
Aluminum and iron, 1.5 per cent.

The extremely low silica content makes it an especially desirable rock for flux purposes in blast furnace work, while the physical properties, extreme hardness and small absorption make it admirably suit-

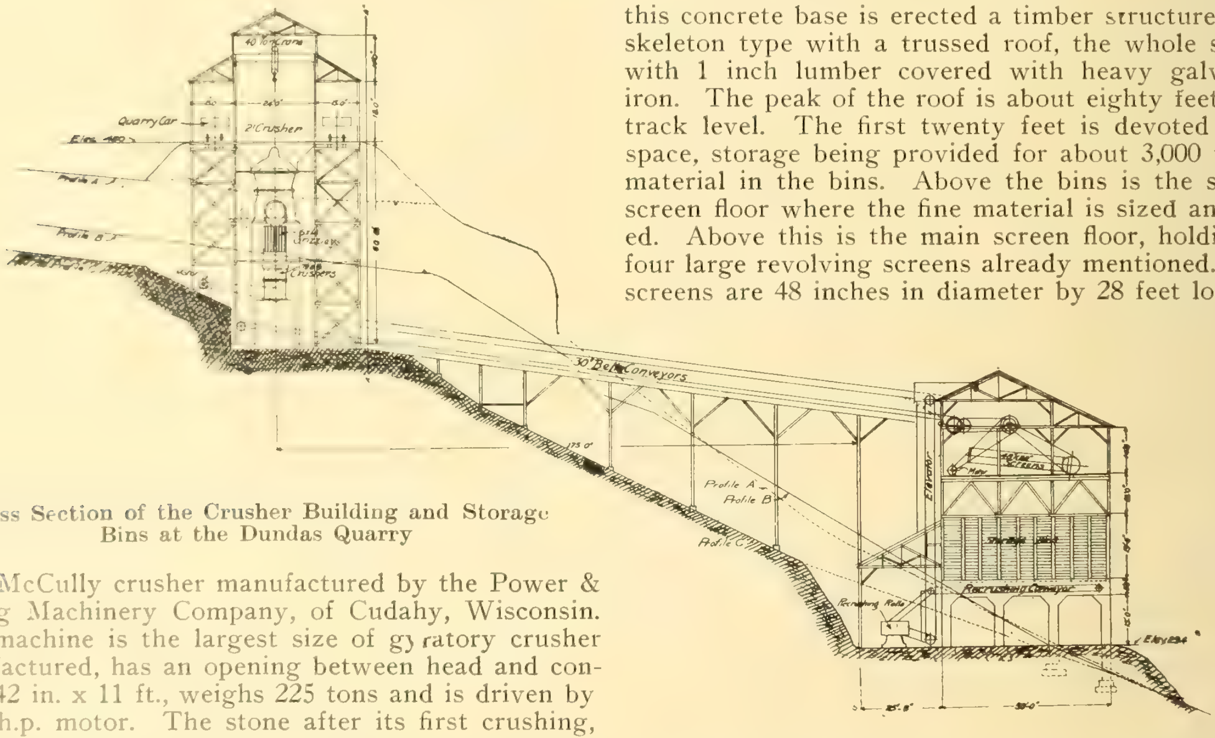
General View of New Crushing and Screening Plant installed by Doolittle & Wilcox

Quarry Sidings, Showing Incline above and Grand Trunk Main Line below ed for road finishing. The beds of limestone dip at a slight inclination to the east.

The quarry property contains 150 acres, the average depth of rock in which is 200 feet, and has been run as a quarry for six years by the present owners. it has been worked in two layers each about twenty feet deep. About 750,000 tons of rock have been taken out and about 12 acres stripped. The construction of the new plant involves the abandoning of the present plants, the installation of much heavier machinery as a primary breaker, and the re-arrangement of the present crushers as auxiliaries to the large breaker and as fine crushers.

Crushing Plant.

The new crushing plant is located on the brow of the mountain, about 1,000 feet east of the old No. 8 plant. Owing to its location on top of the hill it was possible to do away with all elevating machinery and to utilize the force of gravity in every operation from the time the stone is dumped from the quarry cars into the crusher until it is loaded from the storage bins into cars on the sidings ready for shipment.



Cross Section of the Crusher Building and Storage Bins at the Dundas Quarry

The main breaker in the crushing plant is a Mammoth McCully crusher manufactured by the Power & Mining Machinery Company, of Cudahy, Wisconsin. This machine is the largest size of gyratory crusher manufactured, has an opening between head and concaves 42 in. x 11 ft., weighs 225 tons and is driven by a 250 h.p. motor. The stone after its first crushing, discharges right and left over two four-inch grizzlies to a 7½ and a No. 8 Austin crusher set on each side of the Mammoth, arranged to act as auxiliary crushers to it and reduce the stone further to about 2 inches. The fine material from the first crushing taken out by the two grizzlies is collected in hoppers and discharged from these direct into two 30 in. belt conveyors leading to the screens. By taking out this fine material at this point, the load on the smaller crusher is decreased and the output of the entire plant is consequently increased. The auxiliary crushers discharge through the same chute as the grizzly hoppers into the conveyors.

These crushers are all set on reinforced concrete foundations in a pocket excavated in the solid rock. The sides of the excavation are lined with a rubble and concrete retaining wall and the whole roofed over with a reinforced slab 8 inches thick, thus ensuring ample fire protection to the timber trestle work which carries the quarry tracks to the crusher. In order to handle the very heavy machinery it was necessary to install a 50-ton overhead crane running on a structural steel runway. The three crushers are driven by three separate motors, 375 h.p. in all being required for this purpose.

The stone is taken from the crusher building on two 30-in. belt conveyors about 210 feet centres, mentioned before, and delivered into hoppers at the top of the screen building, feeding directly into four revolving screens, each conveyor supplying one pair of screens.

Screen House and Bin Building.

The screen house and bin buliding is a combination of timber and concrete construction, 50 ft. x 50 ft. in ground plan. The foundations are a grillage of heavy concrete slabs reinforced both ways so as to get the effect of a continuous concrete raft. Piers and columns support the building, the floor loads being carried by very heavy concrete girders approximately 2 ft. x 4 ft. in depth, running crossways of the building. The floor slab is of reinforced concrete 14 inches thick and sufficiently high above the track level to allow clearance for cars and locomotives underneath. On this concrete base is erected a timber structure of the skeleton type with a trussed roof, the whole sheeted with 1 inch lumber covered with heavy galvanized iron. The peak of the roof is about eighty feet above track level. The first twenty feet is devoted to bin space, storage being provided for about 3,000 tons of material in the bins. Above the bins is the shaking screen floor where the fine material is sized and sorted. Above this is the main screen floor, holding the four large revolving screens already mentioned. These screens are 48 inches in diameter by 28 feet long and are provided with seven foot dust jackets. They are of very heavy construction and were especially built for the plant after drawings furnished by the company's engineers. This floor also holds the two forty h.p. motors for driving the screens and conveyors, and the 30 h.p. motor which drives the elevator and exhaust fan.

Three loading tracks run directly under the bins lengthwise of the building with loading spouts from each bin, emptying directly into the cars. By this arrangement six cars may be loaded simultaneously and a very large output handled by a small number of men. The loaded cars are dropped down by gravity to the company's track scales.

Re-crushing.

In order to provide for any required amount of fine product, a re-crushing building and two elevators have been installed with room for two sets of crushing rolls. Belt conveyors run from the storage bins to the re-crushing rolls which may be set to any desired size. This allows a further reduction of any surplus material which may remain in the bins, and permits the output of the plant to be regulated to suit the exact demand for any given size of stone. The re-crushed stone, after it has been put through the rolls, is elevated to the top of the screen house by two 14-in. bucket elevators, discharging into the large screens and thus distributed to the bins.

It will be seen that this entire crushing and screening plant is arranged in two halves, thus permitting any necessary repairs on any machine to be made without a shut-down. The material from the quarry can be dumped into any one of the three main crushers and can be handled to the screens through either belt conveyor. Any one or any two of the screens may be stopped for repairs without interfering with the operation of the others. And similarly with the re-crushing operations, one of the rolls and elevators may be run while the other is standing idle. It is thought that the output of one-half of the plant will be sufficient for the demands of the market for some time and that the other half will be used as a reserve plant, thus ensuring practically continuous operation.

Power.

All the crushing and screening machinery, indeed all of the quarrying machinery as well, is driven by electric motors. Power for this purpose is obtained from the Cataract Power Company on an exclusive 10,000 volt line run from the substation in Hamilton. The transformer station for the quarry is a brick and concrete building located at the end of the timber trestle forming the crusher building, and equipped with all necessary transformers, lightning arresters, etc., to transform to 440 volts for the crushing and screening motors. A line to the quarry shovels and drills is run at 2,200 volts and again transformed at convenient places to 220 volts.

Quarry Equipment.

The new quarry is to be opened up 60 feet down from the top of the rock, which will give a quarry face sixty feet deep to work on as soon as the break is made through into the old workings. In order to do this it was necessary to drive a thorough cut through the hillside for a distance of about 400 feet. This cut is about 56 feet wide and about 50 feet deep in the deepest part, but permits of the opening up of the quarry face in a straight line from the crusher and for a distance of about 3,000 feet. On account of the dip of the rock the drainage of the quarry opens out to the hillside where this cut is put through and hence prevents any accumulation of water in the quarry workings.

The rock is drilled by well drilling machines using 5-in. bits and blasted with dynamite. It is loaded by power shovels. One Marion Model 91 steam shovel, weighing 105 tons and equipped with a special manganese steel rock dipper of 3½ yards capacity, has been installed. There is also a Thew Automatic No. 1 shovel and a No. 2 shovel of the same make, both driven by electric motors, and another No. 1 Thew steam shovel which is at present in reserve. These shovels load the blasted rock into 4-yard two-way dump cars in which it is hauled to the crusher building by three 20-ton Vulcan locomotives. Two tracks run into the crusher building so that the stone can be dumped from both sides of the Mammoth crusher. The equipment already installed, with some small additions in the way of extra cars and locomotives, will permit of the handling and crushing of about 4,000 tons of rock per day of 10 hours.

Incline.

The problem of getting supplies and machinery up to the top of the hill was a serious consideration, owing to the impossibility of teaming such heavy loads over the country roads. It was therefore decided to build an inclined standard gauge track down the side of the hill connecting with the sidings below. This track is about 1,400 feet long and runs on a 16 per cent. grade. A heavy duty mine winding engine with an 8 ft. drum was installed at the top of the grade, and all of the new equipment, including the 100-ton shovel and the Mammoth crusher parts, has been handled by this method direct from the railway sidings below to its place in the quarry.

Water Supply.

The quarry company has also installed a pumping station and a 1,000,000 gallon reservoir on top of the hill and built its own water service. A well equipped machine shop handles most of the repair work and has tracks on two floors connecting with the quarry tracks, thus ensuring quick transportation to and from the shop for any heavy repair parts needed. Necessary store rooms, locomotive, blacksmith and carpenter shops, etc., complete this part of the equipment.

Taking the New Shovel into the Quarry

Toronto Business.

Messrs. Doolittle & Wilcox, Limited, have large contracts for supplying flux stone to blast furnaces and open hearth steel plants. Among other large customers being the Steel Company of Canada, in Hamilton, and the Lackawanna Steel Company, in Buffalo. This necessitates the continuous operation of the quarry twelve months in the year. Dundas is situated on the main line of the Grand Trunk and ample shipping facilities are provided for the handling of their product.

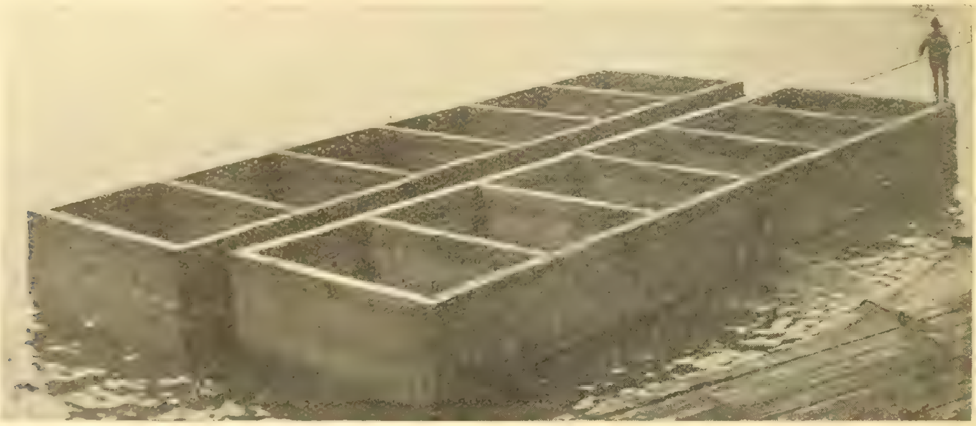
The company handles its Toronto business through the Rogers Supply Company, who have five yards distributed about the city. These are supplied with stone trestles where the stone is dumped direct from hopper bottom cars into storage bins, of a capacity of 2,000 tons, and then loaded into wagons.

The engineering work in connection with this plant was done by the J. C. Buckbee Company, of Chicago, in accordance with general layout furnished by the owners.

Subaqueous Concrete Work at Goderich

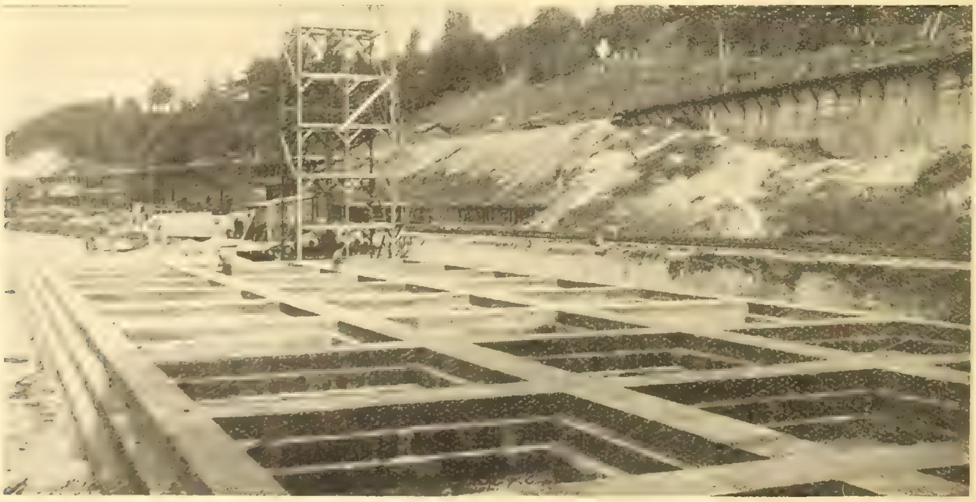
Successful Application of the Pontoon Method—Advantages of Reinforced Monolithic Concrete—Economy and Expediency of This Construction.

Mr. J. H. Tromanhauser, engineer, Toronto, has just completed at Goderich, Ont., the construction of a 500,000 bushel annex to the elevator owned by the Goderich Elevator and Transit Company. A brief description of this work, the early part of which was carried out by means of concrete pontoons, will be of special interest in this number.



Completed Concrete Pontoon Ready for Floating to Site

The elevator annex is of monolithic concrete, designed in accordance with patents controlled by Mr. Tromanhauser, and consists of a series of 27 rectangular bins arranged in three rows on 18-foot centres. The side bins are flat bottomed and 80 feet deep, and the centre bin 70 feet deep, having concrete hopper bottoms under which run two 30-inch collecting conveyors by which the grain is returned to the main building through two elevator legs and spout.



Foundation Slab Built over Sunken Pontoons

The main interest in this construction, however, is centred in the dock, or wharf, which was not built on the site — but some half mile distant. This work marks the first application in Canada of Mr. Tromanhauser's patent pontoon system of subaqueous construction.

The site on which the elevator annex is built was originally part of the harbor, with a depth of water of about 20 feet.

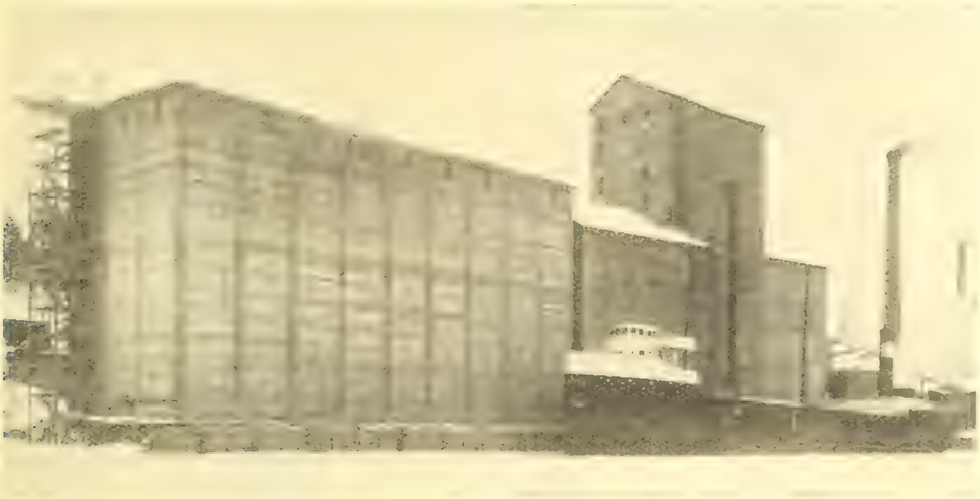
The pontoons for the concrete dock, of which there were four sections, were built on shore at a convenient spot across the harbor. They were each 54 feet by 14 feet, and about 4 feet high, all of timber and made watertight. After completion, they were launched and towed to the concrete mixing plant. Here the forms were set up and the concrete filled in together with the reinforcement, which proceeded as fast as the setting of the concrete would permit. The pontoons were so designed that the weight of the concrete walls would sink them about one foot for every two feet rise of the walls. This was found correct in practice. Ballasting was required as the work progressed. To prevent the concrete sections from becoming top heavy and rolling over, each section as it was completed was towed to the elevator site and sunk in position, the bottom of the harbor having been dredged previously and approximately levelled. The sections were sunk by admitting water into the compartments by means of hose. In large sizes, it is more convenient to build in sea valves for admitting the water.

Having sunk the sections, it was only necessary to drive the foundation piles through the timber bottoms and fill them up with gravel dredged from the site. The space between the shore and the concrete dock sections was then filled, and piles driven for the elevator foundation and the whole covered with the concrete slab to support the building.

The advantage of this system over the old methods of coffer dam and concrete block construction will be appreciated by the engineer and contractor who have to consider similar propositions in regard to both fresh and salt water. It is particularly valuable in latitudes where timber is open to the attack of the teredo.

The sections being watertight, any material can be used for filling, there being no tendency for sand, cement, fine gravel, etc., to be washed out, but on the contrary, to become more solid and compact with age.

In conclusion, we may remark that this system has been found more expeditious and less expensive than the usual method, and is applicable not only to dock construction, but to a wide range of work, such as piers, breakwaters, lighthouses, foundations, sea walls and cofferdams.



General View of Elevator and Annex at Goderich.

The Cement Gun

Perhaps no exhibit now being shown at the Cement Show in Toronto is awakening greater interest on the part of engineers and contractors than that ingenious piece of concrete machinery known as the "cement gun." Briefly stated this machine consists of an engine and compressed air tanks with tank for the dry material, cement and sand. The fact that the aggregates are mixed dry is the chief distinction between this process and former experiments, which have had to do with wet mixtures. Two lines of hose, one carrying the dry-mixed cement and sand and the other water converge in a brass nozzle, where the cement, sand and water come in contact, the flow of water being governed by a faucet attached to the hose. The gun shoots the contents with great force, the nozzle being held about 2½ feet from the surface to be covered with cement or stucco. The machine acts with such force and precision as to make a perfectly mixed and dense waterproof concrete or mortar, apparently impossible to achieve except where great air pressure is used. It is entirely automatic and its precision is in marked contrast with hand work where the personal equation is such an important factor. A surface with interstices will be entirely filled instead of being bridged over as is frequently the case with trowel work. The machine will cover a square yard of surface with concrete 1 inch thick in about two minutes. The concrete will be of a maximum density. In the construction of massive concrete, the stone could be first placed and mortar or binding material applied by the machine. How satisfactory and economical it might be in work of this character was not so apparent, in a recent demonstration, as its wonderful utility in ordinary construction, such, for example, as stucco work, small buildings or fences requiring but an inch or two of dense and impervious cement mortar. To illustrate its utility in this field, an ordinary roll of chicken wire was bent into the form of a post and upon the inside was placed ordinary sheathing paper. The hose was played over this form and there quickly resulted a strong and perfectly satisfactory hollow waterproof concrete post, 8 or 10 inches in diameter and with a uniform thickness of perhaps 2 inches. The same process of construction was applied to small structures, making what might be termed indestructible tents or buildings of thin concrete. One of these buildings, a most flimsy affair in the way of preliminary studding, wire and paper, was filled with shavings and boards, and afterwards set on fire, the mass burning to ashes but without heating the thin walls upon the exterior surface. The machine will undoubtedly bring about a veritable revolution in the construction of very small buildings, fences, posts, stucco work and kindred operations, as it eliminates the use of forms and scaffolding, only ladders being required where it is impossible to use the machine with the workman on the ground. As stated, the water is added in the nozzle, the surface first receiving a thin coat of cement grout followed in turn by additional cement and sand until the required thickness of surface is obtained. By holding the nozzle stationary a 5-inch cone will soon protrude from the surface.

That Ireland will soon have the most important ferro-concrete bridge in the United Kingdom is claimed in a Belfast press article. This will be attended by the reconstruction of the Waterford Bridge. An interesting test of the new St. John's Bridge, Kilkenny, shows the great advantages of this type of construction. The Kilkenny bridge has a 140-ft. span and successfully withstood tests at 200 tons dead weight, which rested on the bridge for several days.

Canadian Contractors and Their Work

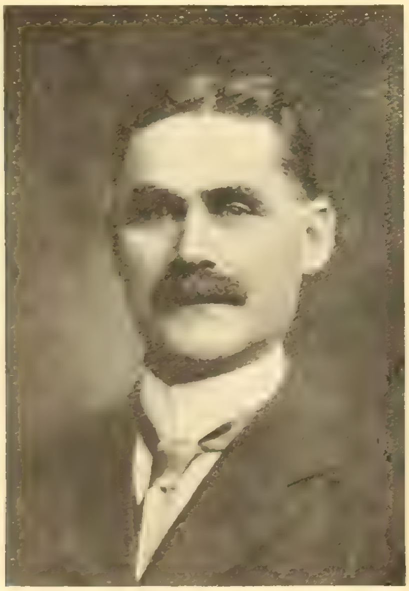
The Careers of Some of Our Successful Men—Brief Notes on their Early Training, Special Lines of Work, Recent Enterprises

The biographical and other information concerning prominent Canadian contractors and those identified closely with the field, given in the following pages, will doubtless be of special interest inasmuch as in the preparation of such work one always encounters an objection to anything savoring of "publicity." That we have encountered this obstacle is evidenced by our inability to secure photographs of a number of those of whom we have given the best information available. We hope to maintain this department, and trust that our contracting friends will co-operate with us by furnishing us with material from time to time. Such sketches as are here presented cannot fail to be informative, and, in many cases, of actual value to those in any way connected with this field. In the following articles we have confined ourselves almost exclusively to particulars of live, business interest. This policy will be maintained in future numbers.

J. H. McKnight Construction Co., Ltd., Toronto

The president of this firm, Mr. J. H. McKnight, is a Canadian by birth, having been born on a farm near the town of Hanover in the year 1864. He went to Toronto in 1886, immediately after which he began contracting for sewerage works. At first his operations were confined mostly to Toronto, but these he afterwards extended throughout the province of Ontario, and in 1892 he branched out into Manitoba, in which province he carried to completion a number of large sewerage contracts.

In 1894 Mr. McKnight began contracting in the United States, his first undertaking being in the city of Cleveland, Ohio, and for the next five years he carried on business in several states of the Union. For two years his work was confined principally to the vicinity of New York, and for a like period he carred on business in the neighborhood of Boston, Mass., where he carried out several large contracts for the Metropolitan Water Commission of Massachusetts. He also installed a number of sewer systems for towns adjoining the city of Boston. In 1902 he built the sewer system of Sault Ste. Marie, where he also paved the main thoroughfare, nearly two miles long, and built the street railway system, comprising four and one-half miles, all ready for the operation of cars. During 1904-5 he constructed many miles of the sewerage system of the city of New Orleans, La., at the same time carrying on large contracts throughout Canada.



Mr. J. H. McKnight, Toronto

By the year 1907 the business had increased to such an extent that Mr. McKnight found it advisable to take into partnership Mr. W. E. Douglas, B.A., C.E., and a limited liability company was formed. Mr. Douglas had had a considerable amount of valuable engineering experience, having been engaged with Mr. Willis Chipman, the well known consulting engineer.

Since its inception the J. H. McKnight Construction Company, Limited, have completed a great many large contracts, consisting of sewerage installations, pavements, dams, etc. At the present time they are engaged upon an extensive contract in connection with the construction of the trunk sewer for the city of Toronto. Of their recent work may be mentioned a large dam, tunnel and power house for the Erindale Power Company. During 1910 they had the contract for laying all the water pipe for the city of Toronto, in addition to several miles of small sewers. They also installed sewerage systems at Haileybury and New Liskeard last year.

Mr. W. E. Douglas, Toronto

Mr. McKnight is a man of diversified interests, but inasmuch as we are concerned primarily with his connection with our own field, it will perhaps suffice to say that for a number of years he has been interested in a considerable amount of speculative building, and that he is president of Clarke & Monds, Limited, whose specialty is concrete construction in all its various phases.

Up to date over $600,000 has been paid over to Mr. John Gunn, the contractor for the city of Winnipeg's hydro-electric power development at Point du Bois.

Mr Fred Holmes, Toronto.

Mr. James Pearson, Toronto.

Mr. C. R. Holmes, Toronto.

Fred Holmes & Sons, Limited, Toronto

One of the most active firms in the building field at Toronto is Fred Holmes & Sons, Limited, at present engaged in the erection of extensive additions to the Parliament Buildings in Queen's Park, costing over half a million dollars, and in building additions to the St. Michael's Hospital and the House of Providence. Among the many interesting contracts which have been completed by this firm in recent years may be mentioned the Grand Stand at Exhibition Park, the Canadian General Electric Company's building, at the corner of King and Simcoe streets, and Shea's new theatre. The president of the firm, Mr. Fred Holmes, is a native of Norwich, England, and came to Canada in 1882, since which date he has been engaged exclusively in the building trade. He takes an active interest in civic administration and is a member of the Toronto Board of Trade. Mr. C. R. Holmes, the secretary-treasurer, has been in partnership with his father for some years and now takes a leading part in the operations of the company.

James Pearson, Toronto

The practice of law is not very often combined with success in estimating for paving and other similar construction work, but Mr. James Pearson, the president of the Constructing and Paving Company, Limited, Confederation Life Chambers, Toronto, has done it, and is doing it with much success. One would think that in connection with this work his knowledge of law would bring him into conflict with the municipal authorities, but, on the contrary, it renders him immune from trouble of that kind. Mr. Pearson combines the business acumen of the contractor with the shrewdness of the lawyer, and he plays the twofold part as few men could play it. In contracting circles he subordinates his professional instincts—except upon very rare occasions, and he is known to the legal profession as a sound and capable lawyer.

Mr. Pearson was born on a farm in the County of Carleton, near Ottawa, in 1850. He is of U. E. stock and of Scotch descent. After teaching school for several years, he studied law and was called to the bar in 1878, taking up the practice of law in Toronto, where he has resided and practised ever since.

In former years Mr. Pearson was a prominent athlete and ever since the times in which he figured as a competitor he has taken an active interest in the promotion of amateur sport, both field and aquatic. He also took a course at the Toronto Military School, from which he obtained both second and first-class certificates. His commission was in the Ottawa Rifles, from which he was transferred to the Queen's Own and at the time of retiring held the rank of second senior captain of that corps.

In law his practice has turned principally to corporation, railway and joint stock company matters. In this way he has become interested largely as a stockholder in several companies. In addition to being president of the Constructing & Paving Company, he holds a similar office in another prosperous concern, the Maple Leaf Portland Cement Company, Limited. In his early years Mr. Pearson acquired a practical and technical education which eminently qualifies him to carry out his several works successfully.

T. Cannon & Son, Limited, Toronto

The above firm have been prominently identified with the Toronto contracting field for the past 24 years, their activities having been confined principally to masonry work.

Mr. T. E. Cannon, Jr., Toronto

Mr. T. Cannon, Sr., had charge of the erection of a number of important buildings in the city, such as the Bank of Montreal, the Standard Bank, the old Traders Bank (recently demolished), Cooke's Church, Biological Building, Queen's Park, the Parliament Buildings and many others in which he was associated with the late Mr. Lionel Yorke.

The work carried out by this firm is distributed over a wide field and includes a number of noteworthy public and commercial buildings, among which may be mentioned the Walmer Road Church, American Watch Case Works, head office of the Imperial Bank, a number of branch buildings for the Canadian Bank of Commerce, Dominion, Imperial, Montreal, Metropolitan and Sterling Banks, the Lawlor Building (King and Yonge streets), and the residences of Sir William Mackenzie, Mr. Donald Mann, Mr. E. B. Osler, Mr. D. B. Hanna and many others. The Ross Memorial Hospital, Lindsay, and the Trinity College School, Port Hope, are among the contracts that they nave carried out in the province. The Sunlight Soap Works, Toronto, is one of their many important factory jobs. The firm have an up-to-date office and yard at 75 Brock avenue, and their own railway siding on the C. P. R.

Mr. T. E. Cannon, Sr. Toronto.

Mr. H. N. Dancy

Mr. T. E. Cannon, jr., whose photograph is reproduced herewith, devotes the greater part of his attention to the estimating part of the business.

Mr. T. Cannon, sr., has the supervision of the actual building operations and is one of the best known figures in the local contracting fraternity. The secretary-treasurer, E. L. Wright, is an efficient officer of the company and during many years in the accounting branch of the business has contributed largely to its success.

H. N. Dancy & Son, Toronto.

The above firm, which is one of the most substantial contracting concerns in the city of Toronto, was founded thirty years ago by Messrs. H. N. Dancy and R. C. Dancy, who started business as the firm of Dancy Bros., contracting for both masonry and plastering. The firm made steady progress, and in 1905 Mr. A. H. Dancy was admitted as a partner. The concern was then known as Dancy Bros. Company. Rather more than two years ago the masonry branch of the business was taken over by H. N. & A. H. Dancy, now carrying on operations as H. N. Dancy & Son.

Photographs of the members of the firm are shown herewith. Mr. H. N. Dancy is a native of England and was brought to Canada at the age of eight years. He entered upon his apprenticeship at an early age and acquired a thorough knowledge of all branches of the work. For a time he was in business at Orillia, Ontario.

Mr. A. H. Dancy, Toronto.

Mr. A. H. Dancy, the son, is a native of Toronto and learned the trade in the regular way after taking a public school course.

Among the many important buildings that have been erected by this firm in recent years may be mentioned the new Wycliffe College, Lumsden Building, residence of Mr. J. W. Flavelle, Empire Building, Toronto Lithographing Company's Building and Price's Dairy. They are at present engaged on the Administration Building of the new General Hospital and a large new residence in Queen's Park for Mr. R. J. Christie.

Wells & Gray, Limited, Toronto

This firm is composed of Messrs. John V. Gray and A. F. Wells. It is a comparatively recent addition to Toronto's engineering and contracting concerns, but by virtue of its progressiveness and a number of important contracts that it has carried out during the last year or so, a few particulars concerning the members of the firm will doubtless be of interest.

Mr. John V. Gray was born in the town of Sandwich, Ont., in 1870. After receiving his education he learned the trade of a carpenter and for several years engaged in contracting, in and around Windsor, Ont. In 1898 Mr. Gray went to Vancouver, B.C., and followed his vocation in that city for two years. On his return he engaged in building contracting in Detroit with Robert Teakle, doing some of the largest work in the city, until 1907, when, in connection with A. F. Wells and D. C. Raymond, he went into the general contracting business in Toronto. The firm name at that time was the Concrete Engineering and Construction Company, Limited. In January, 1910, Mr. Gray and Mr. Wells sold out their interest in the old concern, and re-established themselves in the general contracting business under the name of Wells & Gray, Limited.

Mr. A. F. Wells was born in Sandwich, Ont., in 1880. After graduating from the Windsor Collegiate Institute he spent two years teaching school. He then entered the School of Practical Science, graduating in 1904. During the vacations of 1902 and 1903 he acted as assistant to Mr. F. J. Ure, city engineer of Woodstock, Ont., and after graduating was assistant to the City Engineer of Niagara Falls, Ont. for two years. In the spring of 1905 Mr. Wells passed the final examination for Ontario Land Surveyors, and in 1906 took his degree of B.A.Sc. in Civil Engineering at Toronto University. Duirng the following year he was engaged in engineering work with the Trussed Concrete Steel Company and the late Mr. W. T. Jennings, C.E., going into the contracting business with Mr. Gray early in 1907.

R. Robertson & Sons, Limited, Toronto

The above firm is one of the oldest masonry and general contracting concerns in the Queen City. It was founded by the late Mr. Robert Robertson, Sr., a contracting mason of extensive experience in various branches of the trade in both Scotland and Canada. Since its inception the firm's attention has been devoted principally to large contracts. A number of the most notable buildings of Toronto University stand as a monument to their ability. Among these may be mentioned Convocation Hall, the University Gymnasium, the Physics Building, the Chemistry Building and Men's Residences. Other buildings worthy of mention are the McMaster University Buildings, Toronto Telegram Buildings, Toronto Carpet Works, Wycliffe College Chapel and the Dundas Central Methodist Church, London, Ont.

The late Mr. Robertson placed a high value upon the advantages of a thorough technical training and early associated his sons with him in the business, insisting on their securing a good working knowledge of their trades by means of regular indentured apprenticeship.

After the death of Mr. Robertson, Sr., in 1908, the company was reorganized and incorporated with Mr. Robert Robertson, Sr., as President; Mr. John Robertson, Vice-President, and Mr. W. E. Robertson, Secretary-Treasurer. Since then the firm has maintained the high standard of excellence set by its founder. Its progress is evidenced by the fact that it has completed or has in actual course of construction the following work: the new Provincial Museum, University Library, Thermo-Dynamics Building, Observatory, and the Pathological Building in connection with the new General Hospital.

The members of the firm are all practical men, builders of the third generation, possessing the advantages of youth and energy and an excellent reputation both in and out of the trade. Added to these [illegible] an up-to-date plant equal to the demands of any contract.

Hamilton Bridge Works Co., Ltd., Hamilton

The history of bridge building and the manufacture and erection of steel structures in Canada is the history of the above company, concerning whom some mention is appropriate in this number.

The works were established at Hamilton in 1873. Shortly after this time the company commenced the manufacture of metal bridges—the first in the Canadian field. Previously they were imported from Great Britain, Europe and the United States. Great demands were made upon the plant, and large extensions have been found necessary from time to time.

About 15 years ago the company was re-organized with the late Mr. William Hendrie as president, and Colonel Hendrie as vice-president and manager. On the death of Mr. William Hendrie some years ago, Colonel Hendrie became president, William Hendrie, Jr., vice-president, R. Maitland Roy, C.E., manager, and the late Charles G. Milne, B.A.Sc., chief engineer. The death of Mr. Milne, which occurred in December, 1909, was a severe loss to the company. The late Mr. Milne designed the company's present plant and also many important structures throughout the country.

Hon. Jno. S. Hendrie, Hamilton

Structural steel was not used extensively for buildings in Canada until 1890. The Hamilton Bridge Works Company were connected with the erection of the earliest and best of this kind of work. It would take too long to enumerate the many important structures built by this firm in Toronto and Hamilton. In the former city such buildings as the head office of the Traders Bank, the Toronto

Mr. R. Maitland Roy, Hamilton

General Trusts building, and the Exhibition buildings and grand stand are typical of many, while in the latter they have built practically every steel structure, or furnished practically all of the steel therefor.

A particular feature of the company's business some years ago was the design and construction of steel buildings for cement plants. Some of the first known in the province of Ontario were erected by the Hamilton Bridge Works.

In addition to an enormous amount of municipal work during the last few years, the company have carried out extensive contracts for the Canadian Pacific Railway, the Canadian Northern Railway, the Transcontinental Railway —in fact, for all the lines that have attained the dignity of Canadian railroad systems.

The works of the company, which cover about eight acres, and which have excellent transportation facilities, have been entirely rebuilt during the last ten years. An additional plant is now being erected to handle architectural and general building and highway work.

The officers of the company are as follows: President, Lieut.-Col. Hon. J. S. Hendrie, C.V.O.; vice-president, Major William Hendrie; manager, R. Maitland Roy, C.E.; secretary-treasurer, W. B. Champ; engineer, Robert K. Palmer, C.E.; superintendent of construction, W. C. Greenfield; works superintendent, A. H. Phoenix.

Lieut.-Col. the Hon. John S. Hendrie, C.V.O.

The president, Lieut.-Col. Hendrie, is a native of Hamilton, where he received part of his early education, afterwards proceeding to Upper Canada College. Later, he served his time as engineer with the old Great Western Railway. For many years he was associated with his father, the late Mr. William Hendrie, on numerous railway contracts, following which, for an extended period, he engaged in railway contracting on his own account. Colonel Hendrie is prominent in municipal and provincial administration. He has represented West Hamilton in the Ontario legislature since 1902 and has been a Minister (without portfolio) in the Whitney government since its formation. He also served for two years as mayor of Hamilton, is now chairman of the Railway Committee of the Legislative Assembly, and is also a member of the Hydro-Electric Commission.

Colonel Hendrie has been an enthusiastic military man all his life, starting as a junior officer in the 4th Field Battery and retiring about two years ago as Brigade Commander of the 2nd Brigade, Field Artillery. He is also a member of the Battlefields Commission of Quebec, and Ontario representative of the Strathcona Trust.

Mr. R. Maitland Roy, C.E.

The manager of the Hamilton Bridge Works Company is a native of Stirling, Ont., and was born in 1869. From June, 1886, to October, 1888, he was connected with the traffic and engineering departments of the Grand Trunk Railway. From the latter date until February, 1892, he was identified with the Brown Manufacturing Company, of Belleville, Ont. During this time he gained much useful experience upon the inspection of government and railway supplies, contractors' plant, bridges and structural work. Among the various contracts with which he was connected may be mentioned the government surveys of Belleville harbor and river protection works, also the extensions to Belleville waterworks, and new sewage and pumping plants for the Government institution for the deaf and dumb. From February, 1892, to January, 1898, he was employed by the Central Bridge and Engineering Company of Peterborough, Ont., as inspector, draughtsman, estimator and engineer for railway and highway bridges, and general structural work. He was also engaged upon various surveys of the Trent Canal waters and other works. He has occupied his present position since January, 1898, and is regarded with great confidence in municipal and engineering circles. Mr. Roy is a member of both the Canadian and American Societies of Civil Engineering.

W. I. Bishop, Montreal

Among the more recent contracting and engineering firms of Eastern Canada who have made a reputation for themselves by virtue of their general efficiency and progressiveness, none perhaps is deserving of mention more than the Bishop Construction Company, Limited, of Montreal. We feel sure that our readers will be interested in a few lines concerning the president of this concern, Mr. William Israel Bishop.

Mr. W. I. Bishop, Montreal

While Mr. Bishop's connection with the Canadian field dates back only five years, he had previously obtained much useful experience in the United States. For three years he was with the Aluminum Company of America as engineer and superintendent of construction. Afterwards he became a member of the firm of McLaughlin & Bishop, engaged on sewerage and water power work in New York State, and later, general superintendent for the T. A. Gillespie Company, on large water power development in North Carolina. Starting business in Canada in 1906 as William I. Bishop & Company, he constructed the 33,000 h.p. water power development and large mills for the Northern Aluminum Company. Mr. Bishop afterwards organized the concern known as Rexford-Bishop, Limited. With this company was afterwards incorporated the Concrete Engineering and Construction Company, Limited. Mr. Bishop was born on July 7, 1875.

Armstrong, Morrison & Company, Vancouver

The name of W. H. Armstrong stands out prominently on every page of the history of construction in British Columbia. Mr. Armstrong has engaged in all lines of contracting in the province and has been closely identified with its growth. He is president of the firm of Armstrong, Morrison & Company, Limited, the other members of which are Alexander Morrison, W. C. Ditmars and Robert Armstrong. It would take too long to enumerate the many important works carried out by this firm, but among their most interesting contracts of recent date may be mentioned the new Granville street bridge, a detailed description of which is published elsewhere in this number. Of Mr. Armstrong's various connections it is of interest to recall that he is general manager of the Nicola Valley Coal & Coke Company. He is president of the Keremeos Land Company, a concern with vast irrigation works, and is also interested in the Similkameen Mining & Smelting Company. The Armstrong-Morrison firm are interested largely in the Vancouver Granite Company and the Clayburn Company—the well known brick industry. Mr. Armstrong was born at Stratford on September 18, 1857. His father was associated in railway and bridge building with the late Wm. Whitehead, and he thus had every facility for acquiring an inside knowledge of every branch of the business. In the middle 70's he went west to what is now known as the Rat Portage section of the C. P. R., and was employed by Mr. Whitehead in the construction of part of that railway east of Winnipeg. In 1883 he went further west with Mr. M. J. Haney and was associated with him in the building of the Onderdonk section of the C. P. R. in British Columbia. When the road was taken over by the railway Mr. Armstrong remained as master mechanic and later as general roadmaster, in the latter capacity completing the last lap of the C. P. R. westward, building the line from Port Moody, the first terminus to Vancouver. In 1887 he left the service of the C. P. R. and at once went into general contracting, building most of the early wharves and bridges in the city. Part of this time he was in partnership with the late Dan McGillivray.

Mr. W. H. Armstrong, Vancouver

Mr. Alex. Morrison, Vancouver

Mr. Alexander Morrison.

Mr. Alexander Morrison, the second senior member of the firm, was born in 1851 at Motherwell, Scotland. Here he served his apprenticeship for five years in the building and millwright business. After this he put in several years in the shipbuilding yards on the Clyde at Goven, Scotland. In 1871 he joined in the exodus to Canada and settled in Montreal. Here he continued to follow his business as a general contractor, devoting himself mainly to the erection of industrial plants in and about Montreal. A number of such plants now stand as a monument to his skill and energy, notably the Magog textile mills at Magog, Que. In the course of a number of years he became imbued with the possibilities of the west and in 1891 removed to the then infant city of Vancouver. After looking about for some time he decided to cast in his lot with the late Dan McGillivray and Mr. Armstrong, who were then engaged in building the New Westminster waterworks. He continued with them in the capacity of shop superintendent in their steel pipe works at New Westminster until the completion of this work, when he formed the partnership with Mr. Armstrong, which still exists, and which has developed into one of the most successful contracting and engineering firms in the west. From this time on the history of the two men has been so closely associated that Mr. Morrison's record is pretty well covered in the above sketch of Mr Armstrong's career.

Mr. T. R. Deacon, Winnipeg

Mr. Ditmars, the secretary-treasurer of the company, was born at St. Catharines, Ont., where he received his education and early business training. He, also, went west in 1891 and settled in Vancouver as a representative of the Doty Engine Works of Toronto. In [illegible] he entered the service of Messrs. Armstrong & Morrison as office manager and in 1903 joined the firm as a partner.

T. R. Deacon, Winnipeg

In the contracting field of Western Canada few names are better known than that of T. R. Deacon, president and general manager of the Manitoba Bridge & Iron Works, Limited. Mr. Deacon is a director of the Winnipeg Builders' Exchange and is vice-president of the Canadian Manufacturers' Association for the province of Manitoba. Mr. Dea-

Mr. O. J. Edinger, Edmonton

Mr. A. R. Mainman, Edmonton

Mr. Thos. H. Miller, Edmonton

con is a civil engineer by profession, having graduated from Toronto University twenty years ago this spring. Under his capable direction the concern of which he is president has made rapid strides, and the creditable manner in which it has executed various important contracts in the western field has placed it among the foremost contracting companies in Canada.

Edinger-Nesbitt Construction Co., Ltd., Edmonton.

That Edmonton, Alta., is destined to become a really up-to-date city and a credit to the enterprise of Western Canada is evidenced by the class of buildings now being erected there. These compare favorably with many of those boasted by the larger eastern cities. It naturally follows that a higher standard of skill is demanded of the builders and contractors in that western country than formerly and it gives us much pelasure to introduce to our readers the members of the Edinger-Nesbitt Construction Company, Limited, one of Edmonton's progressive contracting concerns.

Mr. O. J. Edinger, who went to Edmonton some three years ago, is a practical engineer, stone and brick mason. His success in the contracting business may be attributed largely to the valuable experience which he acquired while superintending the erection of large buildings in the United States. In 1910 he associated himself with E. M. Nesbitt, a competent and practical master builder, and built in that year the McDougall Methodist Church, the largest structure of its kind in the city, also the Union Bank, a 3-storey, cut stone and pressed brick, fireproof building.

On the first of this year Mr. A. R. Mainman and Mr. Thos. H. Miller were taken into partnership and a joint stock company was then incorporated. Mr. Mainman, who is now assistant manager, was formerly identified with the old company as accountant. Mr. Miller has a practical business experience, the result of a number of years in the wholesale and retail lumber business. For two years he was general manager and secretary-treasurer of the Edmonton Casket Box & Manufacturing Company, Limited.

The company have every prospect of a busy season's work and we feel sure that a most successful future awaits them.

Mr. E. M. Nesbitt, Edmonton

Mr. J. V. Roemer, Walkerville

Mr. C. S. L. Hertzberg, Walkerville

Trussed Concrete Steel Company of Canada, Limited Walkerville

Mr. J. V. Roemer, the secretary of the above named concern, has been connected with the company, in one capacity or another, for the last five years, during the greater portion of which his attention has been given to the United States field. Quite recently he became identified with the Trussed Concrete Steel Company of Canada, Limited, in his present capacity. He has a wide acquaintance among engineers and contractors, and is enthusiastic concerning the possibilities of the Canadian field.

Mr. C. S. L. Hertzberg, of Walkerville, Ont., engineer for the Trussed Concrete Steel Company of Canada, Limited, is a native of Toronto and was educated at the University of Toronto, graduating from the Faculty of Applied Science and Engineering in 1905. After this he was employed for two years in the engineering department of the C. P. R. on the Ontario and Eastern Division of that railroad, his duties comprising railway location, construction and maintenance of way. He then accepted a position with the Trussed Steel Company of Canada, Limited, in their drafting and designing office at Toronto. In the fall of 1907 he became identified with the Dominion Power & Transmission Company, of Hamilton, and remained with that company until April, 1908. He was then engaged by the Trussed Concrete Steel Company to open their Winnipeg office, of which he had charge until September of last year, when the company appointed him to his present position as engineer, with headquarters at Walkerville.

W. H. Ford, Montreal, General Sales Manager, Canada Cement Company

It is about a year and a half ago since Mr. Ford commenced to handle the business of the Canada Cement Company. At the time of his appointment many hopeful predictions were made concerning the company's future, and the increasing stability of the concern and its popularity among the building interests of the country must be a source of much gratification. The Canada Cement Company control the output of [illegible] value for their money.

Mr. W. H. Ford, Montreal

Mr. Ford came to Canada from the southern states four [illegible] ness. When he was quite a young man he took a four years' mechanical drafting course, and upon graduating, entered the office of W. B. W. Howe, consulting engineer, Spartanburg, S.C. Mr. Howe was one of the special committee appointed by the American Society of Civil Engineers, to draft a uniform set of specifications for Portland cement. His associations with Mr. Howe, especially fitted him for a career in cement. On January 1, 1903, at the age of twenty-four, he engaged with the Carolina Portland Cement Company, of Charlestown, S.C. Shortly after this he was transferred by this company to the Atlanta (Ga.), office, as assistant manager, where he spent two years, after which he went to Louisville, Kentucky, as manager of the sales department for the Kosmos Portland Cement Company.

On the death of the vice-president of the Wm. G. Hartranft Cement Company, of Philadelphia, Mr. Ford was appointed in his stead, and later came to Montreal as vice-president and manager of their Canadian company. Before settling down in this new capacity, he spent six months in touring Canada, becoming familiar with conditions, and making himself known in every city and town in the Dominion. He still retains his position as vice-president of the Hartranft Cement Company, is a member of the Sales Managers Section of the American Society of Portland Cement Manufacturers, is on the Executive Committee of the Canadian Cement and Concrete Association, and is also a member of the Canadian Manufacturers' Association.

M. P. Cotton, Vancouver

Mr. M. P. Cotton is a member of the youngest and at the same time the most enterprising generation of builders in the west. He was born at Kingston, Ont., in 1878, and received his education at the public schools of that city and at [illegible] his direction through the prairies and the mountains are several difficult sections of road which were completed with great success. In 1907 Mr. Cotton severed his connection with the C. P. R. and accepted a position as superintendent for a prominent provincial contractor, with whom he re[illegible] own account, devoting his energies almost exclusively to municipal work. The manner in which the various contracts entrusted to him have been executed testifies to his ability. Without entering into too much detail, it will perhaps be of interest to mention the Little Mountain reservoir

Mr. M. P. Cotton, Vancouver, B. C.

which Mr. Cotton constructed for the city of Vancouver, the roadbed for the Burnaby line of the B. C. E. R., and an extensive fire protection system for the C. P. R. warehouses and wharves along the waterfront. One of Mr. Cotton's latest enterprises, a reinforced concrete wharf at Burrard Inlet, built for the North Vancouver Ferry Company, was opened on the 13th ult. Mr. Cotton's offices are located in the Carter-Cotton Building on Hastings street, Vancouver.

Anton Berg, Toronto

The name of Berg has become a household word not only among the community which is able to appreciate the merits of a good brick press, but also in the whole building fraternity. It is partly because of this, partly owing to our esteem for the man himself, and in some measure because of the fact that the Berg press has come to be recognized as the standard in its line, that we take particular pleasure in bringing Mr. Berg within the sacred precincts of our personal column.

When about thirty years of age, Mr. Berg decided to leave his native Norwegian soil and go to the United States. He made Chicago his destination, and shortly after arriving in that city he obtained a position in McCormick's reaper factory as assistant to the master mechanic. Here he obtained ample scope for his ability, and so well did he demonstrate it that after three years one of the leading manufacturers of brick machinery engaged Mr. Berg as master mechanic, a position which he retained for about twelve years. During the time that he was with this firm he made great developments in all their machinery and was responsible for many important improvements.

Mr. Anton Berg, Toronto

After severing his connection with this firm Mr. Berg constructed a model of his now famous press, pronounced by the United States Government the highest development in the art of brick making. For a number of years Mr. Berg continued to have his machine built in the United States where at this date there are a large number being used with much success.

Mr. Berg first directed his attention to the Canadian market about six years ago. In 1908 he purchased the plant of the Canadian Shipbuilding Company at the corner of Niagara and Bathurst streets. It would take a special number in itself to contain detailed information relative to the development of the Berg industry since that time.

Associated with Mr. Berg are his three sons, all of whom have had a thorough practical training in the business. Mr. Robert Bertram and Mr. Melville Bertram have recently been admitted as partners. A period of unexampled expansion may be looked for.

Mr. Berg is 54 years of age. As may be gathered from the above, he has resided in Canada six years, in the United States eighteen years, and in old Norway thirty years.

News and Notes

Mr. A. H. N. Bruce, C.E., Ottawa, has been appointed chief engineer of the Quebec and Saguenay Railway. The company have filed plans with the department of railways for a line from the present terminus of the railway to a point about ten miles east of Murray Bay, a distance of about 65 miles, and purpose commencing construction as soon as possible.

The Ontario Government has been asked by a deputation from Northern Ontario to build a branch of the Temiskaming & Northern Ontario Railway from Charlton to Gowganda through the village of Elk Lake, a distance of about 40 miles in a direct line, in order to develop the rich mineral, timber and agricultural resources of that part of the country.

It is stated that the English contracting firm of Norton Griffiths & Company, who recently opened an office in Vancouver, are contemplating the construction of a dry dock in that city. Mr. Burton Stewart, the firm's representative, has left for England and will return in April. Mr. Stewart has already secured a number of large contracts for his company and is brimming over with optimism concerning the prospects for development in this country.

Mr. J. W. Stewart, managing director of Foley, Welsh & Stewart, railroad contractors, was recently in Vancouver and stated that the main line of the Grand Trunk Pacific will be completed to Tete Jaune Cache, at the head of navigation on the Fraser river, fifty miles west of Yellowhead Pass at the summit of the Rockies, early in November next. Rails are already laid to a point forty miles east of the summit, near the crossing of the Athabasca river, 210 miles west of Edmonton.

The Legislative Railway Committee has approved a bill to incorporate the Kamouraska and L'Islet Railway Company, which proposed to build a railway line from St. Anne de la Pocatiere, Kamouraska, connecting with the Intercolonial Railway, thence south to the Transcontinental Railway at Ste. Perpetue, L'Islet County, to connect with the Quebec Central. The line will also extend northest from Ste. Anne de la Pecatiere to Riviere Quelle, connecting there with the steamers which run on the St. Lawrence between the North and South shores.

We have received from the John McDougall Caledonian Iron Works Company a copy of their Volute Pump Bulletin, No. 106, which we have found of much interest. The Bulletin contains well illustrated and detailed descriptions of the various Volute Pumps, with specific information regarding their uses and arrangement. The Volute was one of the first types of centrifugal pumps to be developed and has furnished the basis of published tests and of the commonly accepted notions regarding them. If designed without a correct understanding of the fundamental principles involved it will give poor or indifferent results, but it is claimed for the new McDougall Volute Pumps that they embody improvements which enable them to work efficiently up to a head of 65 feet. A high efficiency can be obtained at any head between 15 feet and 65 feet without making these pumps especially large or expensive.

Future of the Canadian Brick Industry

All Conditions Favorable for Unparalelled Development—Necessity for Maintaining High Standard in Various Products—Considerations for the Manufacturer

Specially Contributed by Anton Berg, Toronto

This industry in Canada is of infinite importance, and to-day it is conceived to be on a sound basis. The resources in this line are immeasurable; material for first-class brick of all kinds is plentiful, and in this country is manufactured the very best machinery and equipment for various kinds of brick-making. Men of ability, with capital, have been taking hold of this business and continue to promote the welfare of this industry. Such men I have found in this connection are precautious. For instance, they have made special trips across the line to look into the industry thoroughly, and to note the buildings and structures, material, etc. Hence they select unhesitatingly that which is best for themselves and the future generations of this peerless Dominion of ours. This industry is related closely to that of building and structural work, and for such an important combination it is necessary to study the future. Stepping back for a moment across the border, and viewing the brick industry, we must confess that while some are of the very best, there are many to the contrary. So-called brick are produced which are neither fit nor safe to put into high office structures, desregarding the claims of future generations. Such material, which is widely used, in spite of its short duration of usefulness, will deteriorate and go back to dust, from which state it should never have been taken.

Canadian Products Second to None.

Before entering this country, I had peculiar ideas concerning it and the people. It is surprising to find from the papers that people across the line still have these strange conceptions. I must confess that my ideas have been greatly changed, for now I believe the country to be the grandest, the best and the most resourceful. Men of ability are here in great profusion—men with broad ideas and perfect ideals for the upbuilding of this industry, and if such contend that this industry is one of the head-liners, surely our plan should be to produce the best possible. The recent development in Canada, I venture to say, is just as good as, if not better than any across the border. We manufacture brick in great quantities, material of a high-grade, standing a crushing load of from 4,000 to 9,000 pounds per square inch, brought into sound metallic mass through cohesion. With such building material, properly constructed, we can readily assume leadership in this line.

The various productions of this industry, viz., brick, sewer pipe, terra cotta, enamel-work, etc., are of the best and are manufactured on a sound basis, largely owing to the fact that the men interested are keen to serve the public interests. If the people across the line would take a trip through this great Dominion and examine things thoroughly, I believe they would conclude it much better policy to attend to their own industries and leave us to attend to ours. We can solve our own difficulties in the future as in the past, and we are quite capable of looking after the development of the industry in this country. In point, we have numerous industries planned and equipped by other than Canadian firms, which have been perfect nuisances and failures. As Canadians I believe we owe it as a duty to future generations that we develop this industry to its highest standard. In doing so, we must stand pat in support of our home manufacturies.

I can point readily to Canadian industries of this kind that stand second to none on the whole continent. For instance, take the Don Valley Brick Works, Toronto, and the Pa Prairie Brick Company, La Prairie, Que. I mention these plants especially because they are combined plants and manufacture various kinds of brick and terra cotta, and enamel-work. These contain the latest improvements, both as to machinery and kilns, and general running operations. There are numbers of brick plants of the advanced type, small and large—some making pressed brick only; some making pressed brick and stiff brick; others, paving brick, and plants too numerous to mention producing a good quality of stock or common brick. Of late years there is also manufactured a brick known as the sand-lime or silica-lime brick, which is durable and handsome. Quite a number of sand-lime brick plants are in successful operation in various parts of the Dominion. The writer's aim is not to recommend one product in preference to another, but to show each in the light of its own merits. The purpose of this article, indeed, is only to touch with pride upon the future of the industry and encourage the production of brick and building material development, the best material, which latter, in my estimation, is one of the most important considerations.

Several things must be considered in this connection. In the first place it is essential to have the right kind of material, next to have the proper machinery adapted for each kind of material. A properly constructed kiln is indispensable to the highest results. Location and convenience must be considered carefully. Business ability, and confidence in the growth of the country, are not the least important. And is it not time for the people who are now dwelling in Canada to take the first and best opportunity before foreigners come in and grasp it from our hands? I, for my part, desire no importation of brick and terra cotta from either the United States or other countries, although permissible by paying the duty. If building material should enter duty free, it would be unjust for many reasons, one of which as mentioned previously is abundance of raw material, and another, our vast field for new industries. Labor and money will easily find resources here. In the past, nearly all brick have been manufactured during the summer months, but in late years improvements have developed so that brick are made just as well in winter as in summer. This I believe to be a great improvement, since labor can be employed the year round, and building material is thus available at the early and later parts of the building season. Moreover, when brick plants are in continued operation there is always a better opportunity to keep them in first-class condition.

The attention of contractors, school trustees, and others, is directed to the advertisement in this issue of the Red Cross Sanitary Appliance Company, of Grimsby, Ont. Their "Red Cross" closets are made to fill the requirements where sewerage is not available. Their catalogue, mailed free on application, furnishes full particulars.

On Thursday, February 16th, before the Toronto branch of the Canadian Society of Civil Engineers, Mr. C. R. Young, of the firm of Barber & Young, gave an interesting address [illegible]

Missisquoi Marble: Origin and Progress

A Wonderful Story of Development from Philipsburg, Que.—Growth of the Industry—Its Excellent Resources and Equipment

Canadian growth and development along all possible lines has, during the last decade, been so marked, that it requires more than ordinary expansion or progress to excite even passing interest, but the progress of the enterprise located at Philipsburg, Que., is remarkable, even in the Canadian century of big things.

Four thousand years B.C. the civilizations now described as ancient gave expression to their aesthetic sense by using marble in their temples, theatres and monumental piles. With almost unbroken continuity those who have sought the beautiful and the enduring have had recourse to marble, alike for exterior structure and interior decoration.

The Missisquoi Quarry in 1905.

In the Canada our forefathers knew the log cabin was the ordinary habitation; the frame building, clapboard and painted, was the pretentious dwelling; the massive field-stone residence was prima facie evidence of unusual prosperity, while the cut-stone facades of old public and semi-public buildings represented the consummation of local pride. The interior was commonly of wood and of plaster, and the truly luxurious was reached when these were so fashioned as to be ornamental and decorative in effect.

From the recollections of these "good old days" we turn to the improved conditions of the present, and the prospects for the future. If the picturesque log cabin is all but gone, has it not been replaced by a structure which compensates us with modern conveniences and sanitation? And if we can no longer rest our eye on the massive oak rafters our fathers knew, are we not amply recompensed by the fireproof structure, with its hygienic appointments and elegance of finish?

To-day, all over the Dominion, buildings are in existence, in process of erection, or in contemplation, which call for the combination of fire-resistive quality, convenience, healthfulness, economy and elegance. Such structures are not only erected by the Dominion, by our provinces, and by our municipalities, but our banks, also, our insurance companies, our trust companies and public service corporations, have adopted the commendable policy of housing their activities in the highest expression of architectural skill, the consummation of which calls for marble—in the exterior sometimes; in the interior invariably, and always in the best of marble—of the kinds that are enduring; that retain their color and characteristics; that have beautiful tones, marked configuration and harmonious blending—attributes which are found in the highest state of perfection in the Canadian product.

On looking at the meaningless mass of crude material shown in the photo of the quarry in 1905, one has difficulty in establishing connection between it and the fact that today there are buildings all over the country—from Halifax on the Atlantic to Victoria on the Pacific—beautified by Missisquoi marble; that there are other buildings where it is now being set or erected, and that scores of specifications for still other buildings call for Missisquoi marble. But so it is. From little acorns great oaks grow, and from very humble beginnings in a little over five years the property represented by the foregoing illustration has become the modern business project representing the investment of hundreds of thousands of dollars, affording the livelihood of nearly two hundred men, increasing and diversifying Canadian activity, and placing at the disposal of the architectural profession, at moderate cost, a material unexcelled in some of its qualities and unequalled in most of them.

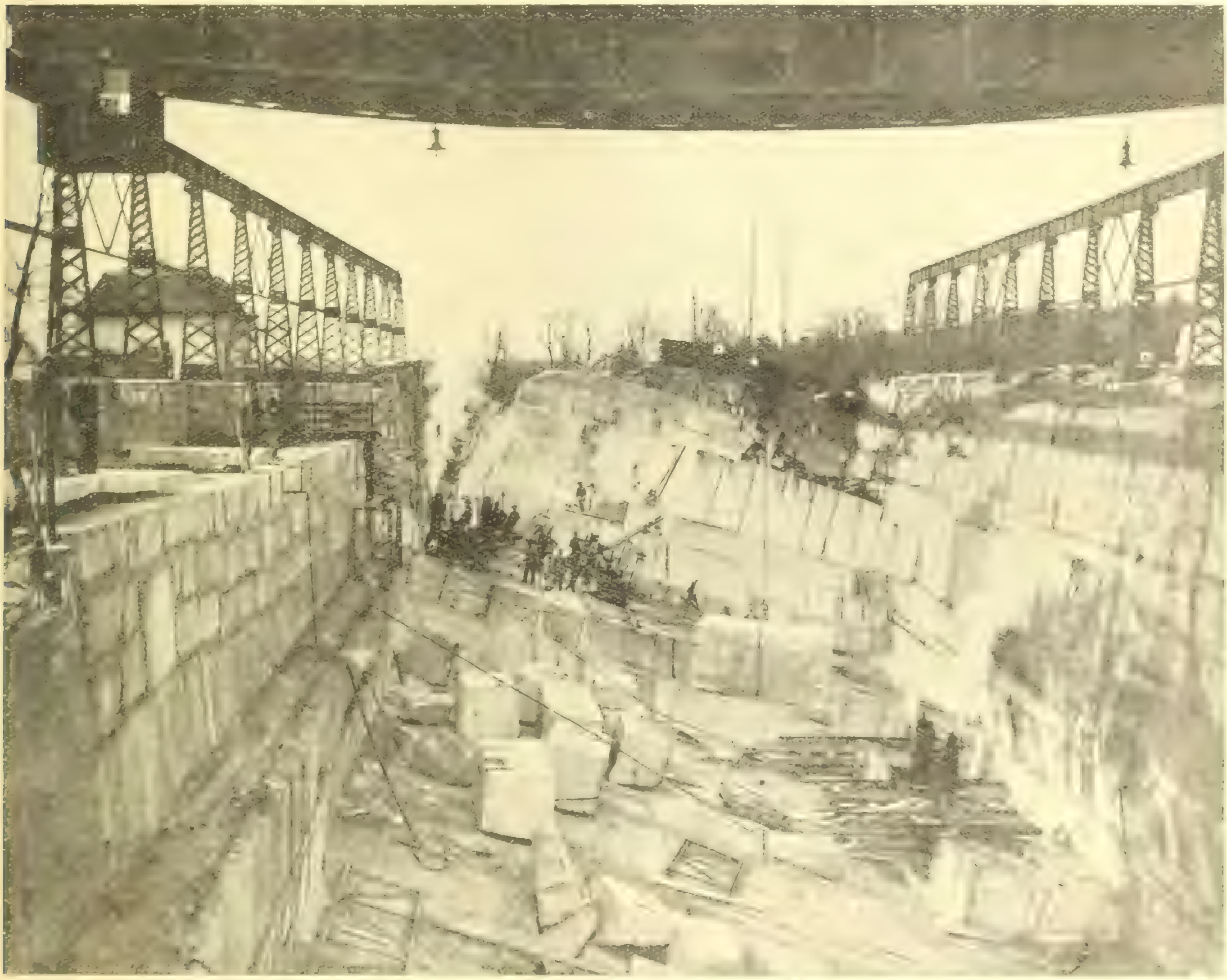
Let it be confessed that the promoters of this enterprise were not actuated solely by patriotic or artistic considerations. They were moved chiefly by the commercial spirit. This impelled them to the employment of the most modern methods in quarrying and the installation, in 1909, of a specially designed, electrically driven crane, with a capacity of 35 tons, a span of 100 feet, and a runway of 500 feet in

Huge Block being Shipped to the United States.

A Group of Employees.

length, giving easy and economical command of the entire area presently under quarry operation.

Nature has not only been kind in the quality of the material at Missisquoi, but she has been generous in the matter of quantity. Core drilling 400 feet to the east of the present working reveals marble; core drilling 1,000 feet to the west discloses marble, while the outcroppings on the ridges north and south also show marble. The great-grand-children of the present generation will probably have had their day before this huge deposit, even with the largest consumption, is exhausted. In variety, also, the deposit is remarkable. In many quarries the marble obtained is of only one color or color combination. In Tennessee, for instance, only two distinct varieties are obtained—a pink and a grey. The Missisquoi quarry, however, is a stratified deposit, and from each strata, or bed, a different variety of marking is obtained, a diversity which may be still further multiplied by horizontal or vertical sawing of the bed.



View of the Missisquoi Marble Company's Fine Quarry at Philipsburg, Que.

An excellent material, in order to attain its proper status in general use, must be marketed in an economical way, and must be furnished promptly when called for. In recognition of this fact, and to keep pace with the ever growing demand for their material, the company, during the past year, have erected what is probably the best designed, most substantial and economical plant of its kind in existence, combining as it does the best features suggested by wide research and practical application.

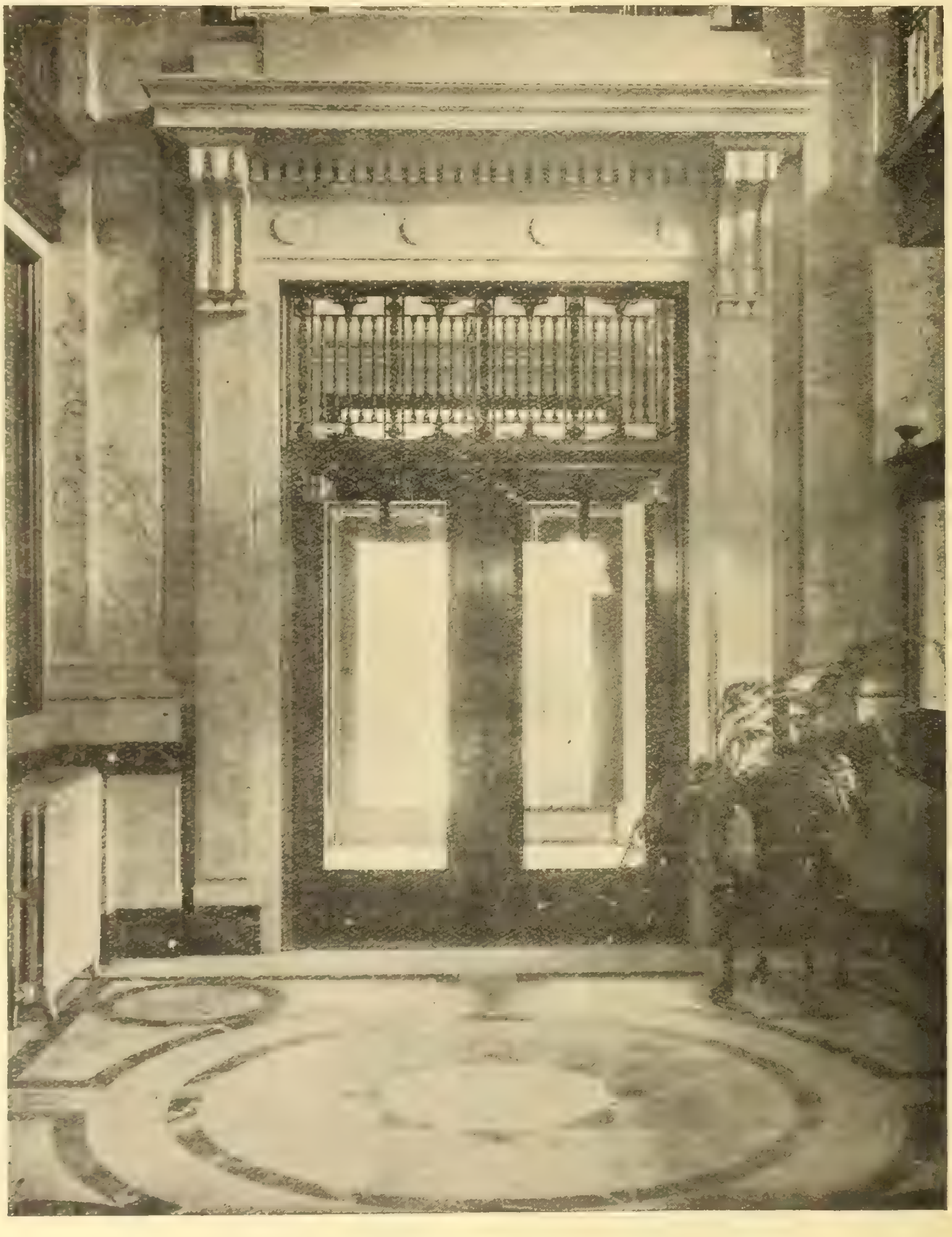
The saw-mill is nearly 400 feet long, by 140 feet in width, and is built entirely of steel and concrete, includng the roof. It contains eighteen gang saws of the most approved pattern, besides circular diamond saws, all of which are served by a second electric travelling crane, similar to the one over the quarry.

The company also has an extensive finishing department, containing rubbing beds, pneumatic tools, polishing machines, planers and carborundum machines, so that the material, when required, may be shipped all fitted, carved and polished ready for erection.

The saw mill and finishing shop are located within 150 feet of the quarry, the blocks being conveyed by trucks which are run down a very moderate grade.

The material is so fine-grained and so rich in appearance that it has been selected by American connoisseurs for such important buildings as the Second National Bank in Cincinnati and the new Hudson County Court House at Jersey City, in spite of a high American tariff.

In addition to developing the quarry, establishing the sales offices and agencies, and erecting the saw mills and finishing plant, the Missisquoi Marble Company acquired, and are the sole owners of the Philipsburg Railway, a standard gauge line running from Philipsburg to Stanbridge, a distance of more than six miles, where a junction is formed with the Central Vermont and Grand Trunk systems, and also with the Canadian Pacific Railway. The shipping facilities by rail leave nothing to be desired. There is also avail-



An Interior Glimpse of the Second National Bank at Cincinnati. The Building is finished in Missisquoi Marble and is a particularly noteworthy example of its possibilities.

able the barge route across Missisquoi Bay to Rouses Point, and thence down the Richelieu river to all points on the St. Lawrence and Ottawa rivers; or southward from Rouses Point down Lake Champlain and the Hudsons river to New York city, Philadelphia, or points reached through Long Island Sound.

The little village of Philipsburg was quite inadequate to the housing of the rapidly increasing populaton which the company's activities induced, and it became necessary to build camps and boarding houses and to erect tenements and cottages for the employees. The importance of having healthful and pleasant surroundings is a large factor in retaining skilful workmen.

Missisquoi marble tells a story of remarkably rapid development, one in which architects and contractors are closely concerned and on which the shareholders are justified in having high hopes.

The Missisquoi Marble Company, Limited, have offices and agencies in all the leading cities and towns of the Dominion, where samples of the product may be seen.

Missisquoi Marble Company's Quarry. Blocks awaiting Shipment or Sawing.

Important New Industry at Hamilton

The Canada Steel Company, Limited, Hamilton, Ont., was organized last May. The plant is now completed and will be running almost immediately. The company is entirely independent of any of the recent mergers, and as they are coming into a field where the competition has been more or less limited, they have been received with much favor by the consumers of steel bars. Their mill is equipped with the most modern machinery and no expense has been spared to make it as efficient as possible. The out put of the mill will consist largely of steel bars for reinforced concrete. These are made from steel which has a high elastic limit, resulting in great economy in construction. The bars are twisted hot. By this means the material is not stretched beyond the elastic limit or crystallized in any way, the quality yielded being very uniform.

A special feature about the mill is that it is operated entirely by electricity. When running at full capacity it will turn out 30,000 tons a year. The plant is located in the heart of the manufacturing district of Hamilton, where the company has secured about five acres of land, situated on both the Grand Trunk and Canadian Pacific Railways. The main building is of iron construction and is 316 feet long by 95 feet wide. Besides this, there are other buildings, such as offices, machine shop and storehouse.

Progressive Concern at Campbellford, Ont.

The Dickson Bridge Works Company, Limited, of Campbellford, Ont., are gradually working their way to the front rank of the bridge companies of Canada, and have made rapid advances both in their plant and output during the last year, having turned out an average of about 100 tons per month.

The entire plant is now driven by electricity. The new equipment installed, includes Cleveland punch, coping machine, spacing table, profile punch, straightening machine, vertical reamers, overhead travellers, and two 10-ton Gantry loading cranes in their yard.

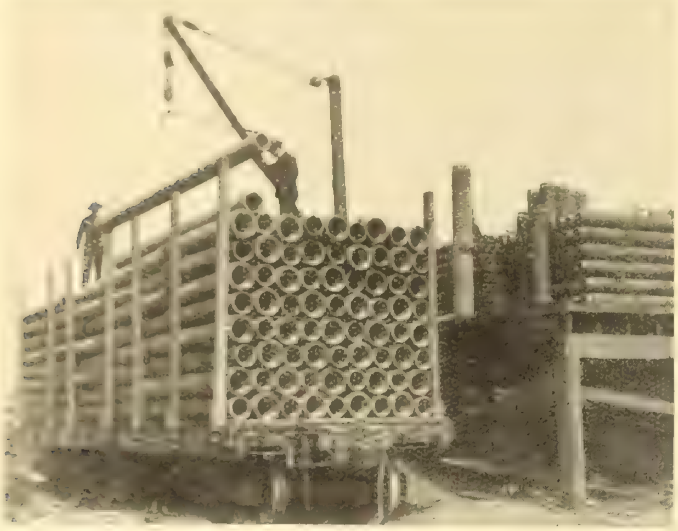
Two of the firm's largest contracts were the Wilton avenue bridge at Toronto, and the Mill Creek viaduct at Strathcona, Alta. The Wilton avenue bridge is a three-hinge arch span of 124 feet centre to centre pins, with two approach spans of 128 feet each. The bridge is 380 feet over all with 42-foot roadway, two street car tracks, and two six-foot sidewalks. Over 500 tons of steel were used in its construction.

The Mill Creek viaduct is 495 feet long, made up of 60 ft. and 30 ft. tower spans, 75 feet high at centre, 20-foot roadway with one street car track, and two 4-foot sidewalks

Canada's Pioneer Wood Pipe Industry

Pacific Wood Pipe Company's Modern Plant at Vancouver, B.C. —One of the Most Complete of its Kind in the Dominion

One of the pleasing effects of the tremendous development that is taking place in lumbering, fruit raising, farming, and all other lines of industry carried on in Western Canada and British Columbia, is a steadily growing appreciation of the merits of wood pipe for almost all purposes for which iron pipe is used n the east. Costing only about one-half the price of the latter, there are the added advantages that it is more easily handled, can be laid more rapidly, and does not attract the frost as iron does. To-day engineers are recommending wood pipe very generally, with the result that it is being used for city and rural water mains, fire protection systems for mills and factories, power lines at development plants, extensive irrigation schemes, and for the varied needs of mines and ranchers.



Carload of six-inch Pipe Stock about ready for shipment

Growth of Pioneer Factory.

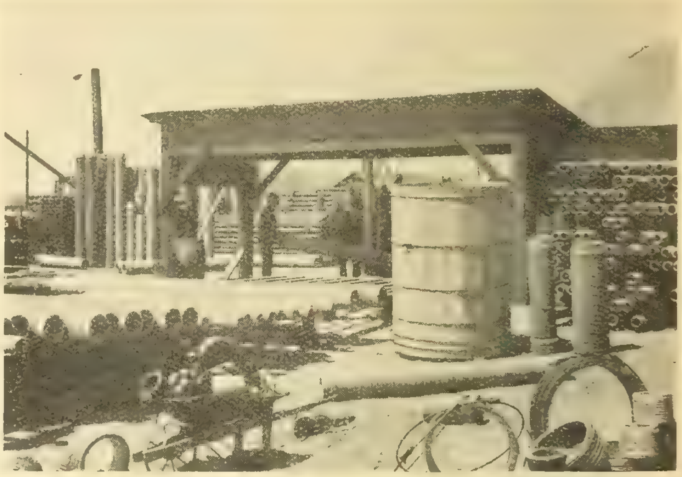
The plant of the Pacific Wood Pipe Company, established in Vancouver over seven years ago, was the first to be built in Western Canada, and as far as can be ascertained, it was the pioneer industry of the kind in the Dominion. By always turning out a superior article the business was steadily increased, and to-day the company operates a large and complete factory equipped with a double set of machines built expressly for wood pipe winding, giving a proper and uniform tension at all points.

During the past six years the company has furnished wood pipe for many important systems, all of which are giving splendid satisfaction. The output during the past five years has been over 500 miles of wood pipe of various sizes, the 1910 output being just double the record for 1909. At present the plant is working on two of the largest contracts for wood pipe ever awarded. One of these is for the new water system being put in by Richmond municipality, about 70 miles in all, the sizes of pipe varying from 12 inches to 3 inches; the other is for Delta municipality water system, the pipe varying from 14 inches to 2 inches. The testing of both systems is about two-thirds completed and has been entirely satisfactory to the engineers in charge of the works. In addition the company has under construction three miles of 18-inch pipe near Ashcroft, a long stretch of 4-foot diameter continuous stave pipe at Kamloops, and a 10 and 11-foot diameter pipe line at the plant of the Powell River Paper Company, up the coast, as well as several irrigation projects and a number of reservoir tanks.

Some Interesting Notes.

One important factor in maintaining uniform quality of product is the care taken of pipe material. All stock used is specially kiln-dried fir, carefully selected.

The plant has had to be enlarged several times to cope with the increase in orders. The present capacity is two miles of wood pipe per day under "rush order" conditions, a double set of machines being operated.



Pipe Stock, Fittings and Reservoir Tank being assembled for loading

The factory is most advantageously located, it being close to navigation and having the best of trackage facilities. Shipments may be made via C. P. R., Great Northern or British Columbia Electric Railways. Orders have been filled for points as far east as Ottawa and Montreal. A large and growing trade is also being done by the company with prairie towns and municipalities.

Mr. O. C. Schultz, manager of the company, has been at the head of affairs since 1908.

In the advertising section of this issue will be found the company's full page illustrated announcement, showing views of pipe, tanks and fittings ready for shipment.

Mr. John Frankman, the well known bridge contractor of Minneapolis, Minn., arrived recently in Winnipeg for the purpose of resuming operations on the construction of the Brant street bridge. The piers for this structure are already in and work will be renewed about the beginning of April. Other important contracts which Mr. Frankman has in hand are new train sheds and several bridges for the Canadian Northern Railway. Mr. Ford has incorporated a new concern which will be known as the Winnipeg Bridge & Construction Company, having permanent headquarters and staff in Winnipeg.

Modern Hoisting Machinery

It might be thought that the manufacture and sale of hoisting machinery would be at best a small business, and that the demand for such specialized machinery would be rather uncertain and spasmodic, but there is at least one concern in Canada that has found it a paying investment to concentrate on this one class of machinery, and that is Marsh & Henthorn, Limited, of Belleville, Ont. Steadily, year by year, the business of this firm has increased, and their hoists are now in use all over Canada. From time to time it has been found necessary to increase their plant until now they have about reached the limit of their present site, and it may soon be necessary to procure new quarters.

Stocks of the Marsh & Henthorn Hoisting Engines are now carried in warerooms in Montreal, Belleville and Winnipeg, and negotiations are now under way for the carrying of additional stocks in Calgary and Vancouver. This is being made necessary by the remarkable activity throughout the west in railroad construction, irrigation work, mining development, lumbering and general building operatoins, in all of which modern hoisting machinery is almost indispensable.

The development of the concern has been due largely to the business ability of its manager, Mr. L. W. Marsh. Starting with a very insignificant capital, the firm has risen to its present position of prominence by reason of the financial skill of its manager, backed by goods of the right quality. The citizens of Belleville recognized the talent Mr. Marsh has and made him their minister of finance for two years, after which they elected him as Mayor for another two years. At the election of the present year Mr. Marsh declined the honor in order that he might have more time for his business and military matters, he being also Major of the 15th Regiment A.L.I.

The marketing of the Marsh & Henthorn hoisting machinery is done by Mussons Limited, of Montreal. A first class machine, coupled with an excellent selling organization, makes a combination hard to beat, and the prospects are very bright for continued growth and expansion.

Canadian Engineering Instruments

The growth of Canadian industries in general and what are known as the "select trades" in particular is illustrated by the establishment in Toronto of a scientific instrument factory for the construction of all kinds of instruments pertaining to engineering and surveying.

The Consolidated Optical Company, Limited, and their predecessors, who have been well known for the past twenty years as makers of optical instruments, extended their equipment a couple of years ago to include engineers' instruments, and are now making for the Canadian trade a line of transits and levels equal to the most exacting requirements.

The convenience and desirability of a "home" factory is apparent, and it is of interest to know that the demand has exceeded the supply.

The Consolidated Optical Company, Limited, who are at present located at 61-67 Simcoe street, are erecting a modern factory building at 386 to 402 Richmond street west, of which they have arranged to take possession on May 1st.

The Railway Committee of the Legislative Assembly has passed the bill to incorporate the Richmond, Magog and Stanstead Railway Company, with headquarters at Sherbrooke, Que., and a capital stock of $1,000,000. The company proposes to build its railway line from the town of Richmond through the counties of Richmond, Sherbrooke stead Plain, a distance altogether of 50 miles, opening up what is described as a country rich in timber and mineral deposits. Branch lines may be also constructed, agreements entered into with other companies, for running rights over each other's lines.

Collapsible Steel Forms

The Concrete Form & Engine Company, of Detroit, Mich., successor to the Collapsible Steel Form Company, of Detroit and Carson City, Mich., and the new Belle Isle Motor Company, of Detroit, whose advertisement appears in this issue, will no doubt find ready sale for their extensive output of collapsible steel forms, concrete machinery and marine and general utility engines. Under the new organization and management recently inaugurated every effort will be made to bring before the users throughout the country the superior merit of their line.

The collapsible steel form manufactured by this company is light and easily handled, yet combining strength and indestructibility. There has yet to be recorded a single failure to give satisfaction where this form has been used. It is entirely practical not only in building culverts, but conduits, sewers, small bridges, tunnels, etc.

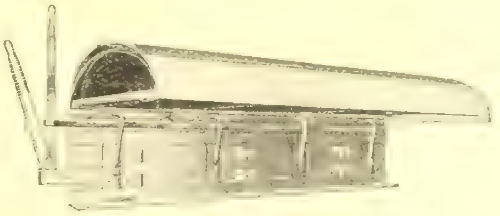


Fig. 1

The forms are constructed in three pieces, the top which is semi-circular, and two side plates. The top and one side plate are shown in figure 1. The working parts of the form are very simple and easy to operate. The top, situated between the two side plates, is held in position by arms attached to the side plates by bolts, which allow them to be lowered by pulling the draw rods which are attached to the arms. See figure 2. By pulling the draw rods the arms are lowered and the support of the top is removed, allowing the top to be lowered. The side plates are held in position by swinging braces so that when locked the sides are immovable. End plates are made which fasten on the top and side plates by keys so that they may be easily removed.

The form complete, with side, top and end plates, ready for the concrete is shown in figure 2. If the user purchases two side plates and extra standard size tops, it is possible to build most any size culvert required in the average work. This in itself is an economy readily appreciated.

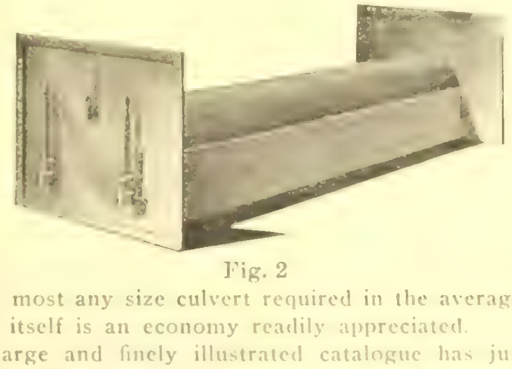


Fig. 2

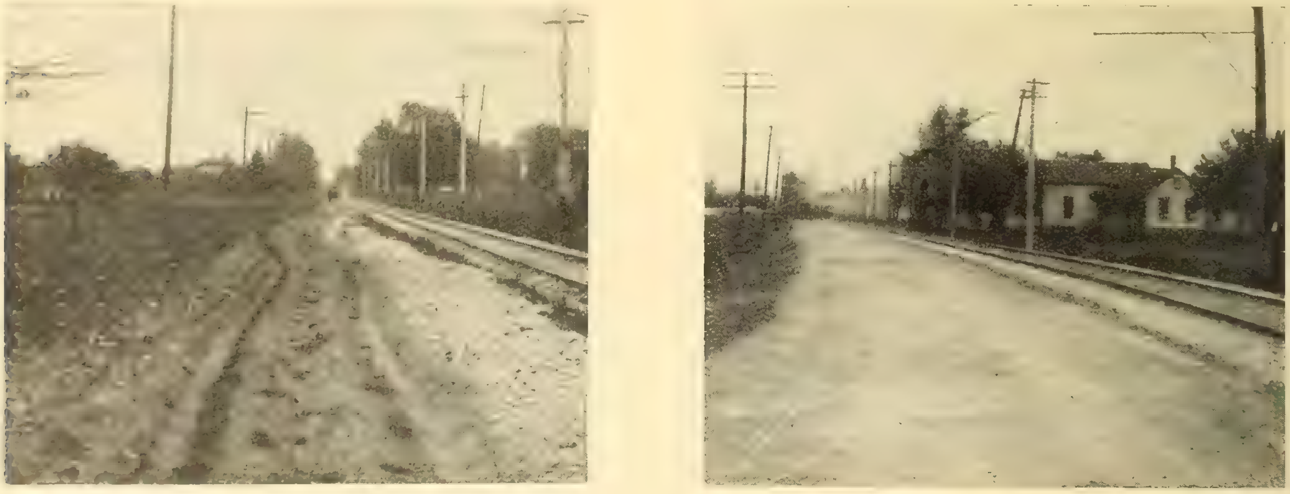
A large and finely illustrated catalogue has just been issued, which may be had for the asking. A Commissioners' Time Book is also furnished free if desired.

Mr James Hutcheon has been engaged as City Engineer of Guelph, Ont., at a salary of $1,900 a year. He will have two months leave of absence each year, during which time he will employ Mr. Lindsay Malcolm, of Queen's University, Kingston, to undertake his duties.

The Lake Front Drive in Wisconsin

A Noteworthy and Enterprising Piece of Work carried out by the J. I. Case Threshing Machine Company — Constructional Details

What is known as the Lake Front Drive, between Kenosha and Racine, Wisconsin, is an extension, or rather, continuation of the Sheridan drive, which leads out of Chicago toward Milwaukee. Most of the distance the road runs along the top of the bluff, overlooking Lake Michigan. The ten-mile stretch between Kenosha and Racine was partially graded some years ago, but has never been macadamized. Until the motor car traffic became heavy, the soil, which packed well in ordinary weather, was considered a fairly good road during most of the year. Latterly, however, it has become worn into ruts and holes by the combined traffic of motor and horse drawn vehicles and many complaints have been made of its condition, especially by automobilists.


Before and After—Typical Transformation of Roadway effected by the J. I. Case Company

The officials of the two townships through which this piece of road runs did not feel that they could afford to improve the road in the manner that the pleasure traffic seemed to require. It was not felt to be as important as a market road, as some others further back from the lake shore and the officials considered that the limited amounts of money at their disposal for road improvement should be expended where the greatest number of citizens, and especially the dairy and truck growing interests would be benefited. An effort was made primarily to secure subscriptions for improving the road. This effort did not succeed, and consequently, some months ago, the J. I. Case Threshing Machine Company, whose offices and factory are at Racine, offered to construct the road, at its own expense, if the towns would furnish the material. The proposition was immediately accepted and the work was begun at once. A part of the road is now completed and the balance is in various stages of improvement.

Case Roller Tender Grader and Automobile

The bluff, along the top of which the road is located, rises about 60 feet above the lake level. The material furnished was the hard boulders, which lie at the foot of the bluff, along the narrow strip of shore between the foot of the bluff and the water line. The stone is crushed by a Case rock crusher, driven by a 75 h.p. Case traction engine, which machines were placed in position at the foot of the bluff. An inclined roadway, with a rise of 60 feet, in a distance of 180 feet, was constructed, over which to haul the crushed stone from the crusher to the roadway. The hauling was done by setting a post with a pulley attached at the top of the incline; a cable was run from a wagon at its loading point at the crusher, through the pulley at the top of the grade, to a Case traction engine operating on the level of the roadway at the top of the bluff. The cable was then hitched to an empty wagon, the weight of which pulled it back down the incline for another load, while the traction engine hauled the loaded wagon to the roadway.

In the construction, the road, which had been packed by the traffic, was regraded with a road machine to a crown of about 6 inches and the crushed stone applied to a depth of 8 or 10 inches, according to the condition of the foundation. This was thoroughly compacted with a 10-ton Case roller, and water was applied in the manner usual in the construction of macadam roads. It is expected by the Case company and by the local officials, that, owing to the excessive hardness and toughness of the stone used and the unusual amount of metal applied, the road will be more durable than most of those of macadam construction.

It is stated by the Case company that in addition to its sentiment of public spirit in offering to construct the road, the convenience to the company of a road where its automobiles may be properly tested will not be inconsiderable.

Road Building and Contractors Machinery

The American Road Machine Company, of Canada, Limited, Goderich, Ont., are the Canadian manufacturers of the "Champion" line of street and road making machinery. The works at Goderich cover a large area near the centre of the town, and shipments are made and received over both the Grand Trunk and Canadian Pacific Railways, thus affording prompt shipment and quick deliveries to all parts of the country. Only the best material is used in the construction of the Champion machinery, and the mechanics employed by the company are men thoroughly familiar with this special line of work.

Large increases in the sales of the company during the past two seasons demonstrated that the selling end could be handled to better advantage if separated and moved to a more central point. With this purpose in view, the Hamilton Machinery Company, Limited, with offices and sales rooms at 144 York street, Hamilton, Ont., was formed to handle the entire output of the American Road Machine Company, thus allowing the manufacturers to devote all their attention to their machinery.

An Interesting Announcement

It will be of interest to the many friends and customers of the Consolidated Plate Glass Company, Toronto, to know that this firm will be moving into their fine new building at 241 Spadina avenue in June next. This progressive firm found that owing to the greatly increased demand for their goods larger premises were necessary, and they are erecting a handsome five-storey warehouse which will combine the head office, factory and warehouse under one roof. The latest appliances for the handling of glass are being installed, not only with a view to economy, but also that their customers may benefit by quick shipments. One of the features of this business is that glass is seldom ordered before required and is consequently needed at once. With this knowledge before them, the Consolidated Plate Glass Company are bending every energy to install such a system that cannot help but bring satisfaction to the customer. The building will have 50 feet frontage and will be 140 feet deep. It will contain 4,200 feet of floor space. The offices will occupy the front of the ground floor, the balance of this floor being devoted to the storing of extra large plates. At the rear will be located a large shipping room with overhead trolleys to facilitate the handling of cases. The upper floors will be used for the smaller sizes of plate, fancy and window glass, and also for factory purposes.

Fireproof Windows and Doors

Realizing the demand for fireproof wnidows and doors, Messrs. A. B. Ormsby, Limited, were the first to enter this market in Canada and they still hold a leading position by giving their customers the highest and best in this class of goods.

In kalameined clad doors, they make doors that are as ornamental as they are fireproof, that are made to any detail and that, when painted and grained, cannot be told from a wooden door. But they give fire protection, lower insurance rates and add to the appearance of the building in which they are installed. These doors are made by machinery. There are no seams or nail heads showing and everything is exactly to detail. Their terne clad doors bear the underwriters' label—which means the maximum reduction in insurance rates. On the sliding doors they use adjustable hangers, which save considerable time in the hanging.

Their fireproof windows are made by machinery. The sash and the moulded parts of the frames are pressed in steel dies, thus ensuring their absolute accuracy as to form. Hollow metal fireproof windows are the only windows that have ever stood a fire test.

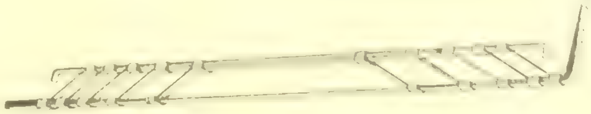
Skylights are given special attention. They are made fireproof, rainproof, dust and coldproof. Cornices, piping work and ceilings are looked after to the best advantage in what is one of the finest equipped factories in the line on the continent.

With two plants, one in the east and one in the west, they ship to every province in the Dominion. Among their recent fireproof work may be mentioned: Metropolitan Building, Vancouver—fireproof doors and screens; Edmonton School Board, Edmonton, Alta., new schools—fireproof doors and screens; legislative buildings, Regina, Sask.—fireproof doors; Fort Garry Station, Winnipeg—fireproof doors; Bemis Bag Company, Winnipeg—fireproof windows and doors; Lumsden Building, Toronto, and new Registry Office, Hamilton—fireproof windows and doors; Duchesneau Building, Montreal—fireproof windows and doors; Telephone Building, St. John, N.B.—fireproof windows and doors; J. J. Johnson Building, Johannesburg, South Africa—fireproof doors.

A New Reinforcing for Cement

In reinforcing concrete, economy is a very [illegible] thing, and the accurate disposition of steel is also very desirable, but heretofore these two vital elements in any system for reinforcing concrete did not appear to dwell in harmony. Now, however, our attention is called to a new system wherein economy and accuracy of design are united. These two terms are actually interdependent; for if there is an inaccuracy in design there must be a loss of efficiency and consequently of economy. If there is more steel at any point than is necessary there is a lack of economy caused by the excessive use of steel.

"A chain is only as strong as its weakest link," and so it is with a concrete structure. It is only as strong as its weakest point. There is little use in providing abundantly for tension if shear is not properly cared for; and there is not much use in providing shear members if they are not absolutely prevented from slipping and if they are not capable of transmitting the stresses from the positive tension member to the negative tension member. A system which provides shear members to develop the strength of the positive tension member and then throws the stress back on the concrete is obviously incorrect.



Too long has reinforced concrete construction strayed from the path of the rational and common sense principles of mechanics. Now we are glad to note that it has at last come back from vague theory and uncertain assumptions to the old reliable principles of stress.

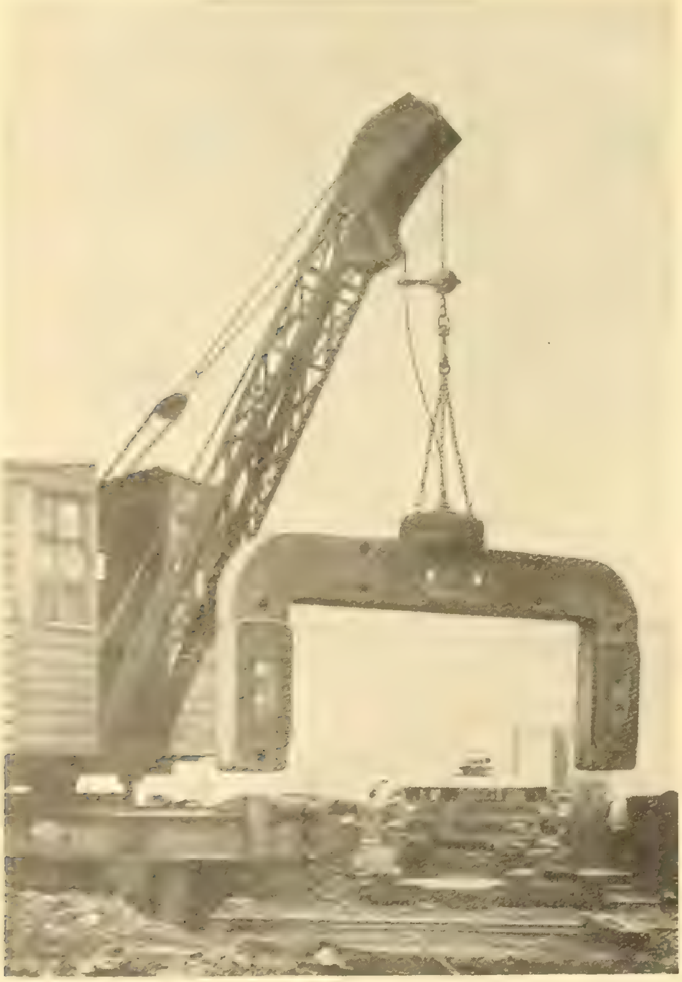
In the system before us we notice that all tension, both horizontal and diagonal, and all shear is cared for by the steel, and that the concrete is called upon to resist compression only. The units are built up from a number of flat bars [illegible] at points along their length to form shear members, and are again united to form a negative tension member, both tension members varying in section according to stresses therein. The clamps are theoretically unnecessary and are provided to hold the bars together. In practice, however, they also [illegible] placed in one beam and as the whole frame is a rigid truss it is impossible to displace the steel during concreting. The [illegible] adaptable to any form of construction—beams, bridges, culverts, retaining walls, slabs, etc

Patents on the above system are held in Canada, the United States and Great Britain by Mr. Sidney Burrowes, Niagara Falls Centre, Ont.

Electric Lifting Magnets

The affinity of magnets for iron and steel, although generally known for centuries, has not been commercially employed until recent years. Factory Products, Limited, of Toronto, are agents for what seems entirely new in Canada in the way of a lifting magnet. These mechanically perfect devices are made in a variety of shapes, sizes and strengths, and can be employed to handle iron and steel in any form.

In foundaries, rolling mills and engineering works where much labor is wasted in handling small material, the electric lifting magnets can effect a surprising saving. The field of these magnets is not limited to small material as one magnet is capable of lifting a bloom or ingot weighing ten tons, and when a battery of magnets are employed almost any weight of iron or steel transportable can be handled.



A 2-ft diameter Magnet holding a 3-ton casting

The question naturally asked concerning the magnet, is, "What happens when the power goes off or a wire breaks?" The possibility is no more probable than a chain or cable breaking on the ordinary crane. In some cases it is advisable to instal an additional accumulator battery to work in parallel with the dynamo so that if the power does go off the accumulator immediately takes up the load.

Witton-Krammer Magnetic Rail Transporter

The smaller illustration shows the Witton-Kramer magnetic rail transporter, consisting of a battery of elliptical magnets suspended from a common bar.

The larger illustration shows a magnet holding a three-ton casting in mid air.

Portable Saw Rig

The Oshkosh Logging Tool Company, of Oshkosh, Wis., are manufacturing a portable rip and swing cross-cut saw rig, a brief description of which will doubtless be of interest to our readers. The machine is equipped for power with either a gasoline engine or electric motor, and is mounted on heavy hardwood skids, thus affording a base practically as solid as a permanent foundation. The feature of the machine part of the rig is the swinging arbor, which is made to swing for cross cutting and held rigid for rip sawing, and is controlled by a lever on the side of the machine. A lever is placed in a suitable position for operating the saw when cross cutting. These machines are equipped with sliding scale for sawing various widths, also miter device for all kinds of miter sawing. The saw is covered by an adjustable saw guard which may be set to any height. Iron saw tables are made large enough. Attached to the iron tables are two side tables which facilitate the sawing of long and heavy lumber. A hook is fastened on each end of the skids which allows the handling of this rig by a team of horses.

The portable saw rig is made in two sizes. Size No. 1 carries 14-inch saws, weighs 1,800 lbs., and has a 6 h.p. gasoline engine; with the same saws and with a 5 h.p. electric motor the weight is 1,400 lbs. Size No. 2 carries 20-inch saws with a 10 h.p. gasoline engine, weight 2,400 lbs.; with the same size saws and 10 h.p. electric motor the weight is 1,600 lbs.

We have a copy of a letter from Collins Bros., general contractors, Rock Island, Ill., in which it is shown that the machine has taken the place of six carpenters in a single day. From an economical standpoint alone the Oshkosh portable saw rig would appear to be worthy of the close investigation of the contracting interests.

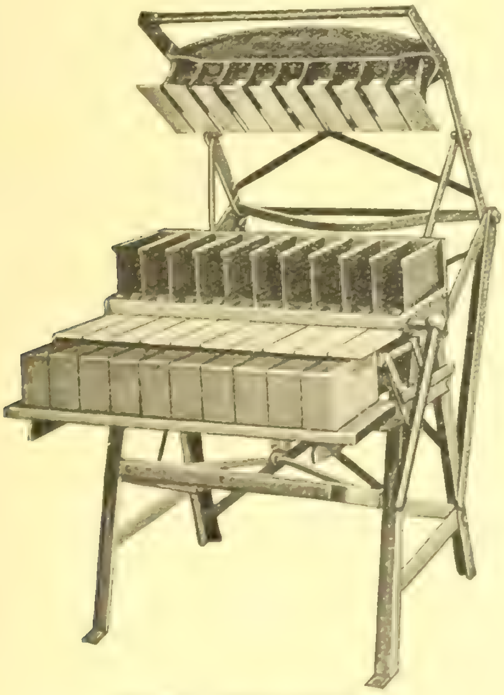
The Lethbridge Builders' Exchange has decided to unite with those of Edmonton and Calgary, and possibly Medicine Hat, to form a provincial Builders' Exchange. They will adopt a uniform scale of wages and adhere to the open shop.

New Building Material Firm

Elsewhere in this issue will be found space occupied by a new firm in the building material line—E. V. Albury & Company, Limited, of Vancouver and Victoria, B.C. Mr. E. V. Alburty, the principal in the firm, comes from the United States, and has had a life-long experience in this particular line. Associated with Mr. Alburty are Mr. Chas. H. Glasser, recently from Chicago, and Mr. Wm. Tozer, late of Liverpool, England. This new firm are British Columbia representatives for some large manufacturers in the United States and Canada, whose interests will be looked after in conjunction with carrying on a general builders' supply business. Temporary warehouses on Pender and Powell streets are at present being used until their permanent place can be completed on Harris and Ramur avenues. The new company have opened places of business in Victoria as well, and report the prospect there very encouraging.

The Perfect Brick Machine

One of the interesting events that will be found at the Cement Show is the Perfect Brick Machine, invented and manufactured by C. S. Wert, of Kendallville, Indiana. Mr. Wert, for a number of years, has been an ardent advocate of the use of cement for building purpose, and has now invented and patented, both in United States and Canada, a brick machine worthy of the special consideration of those interested in economical and time-saving devices.



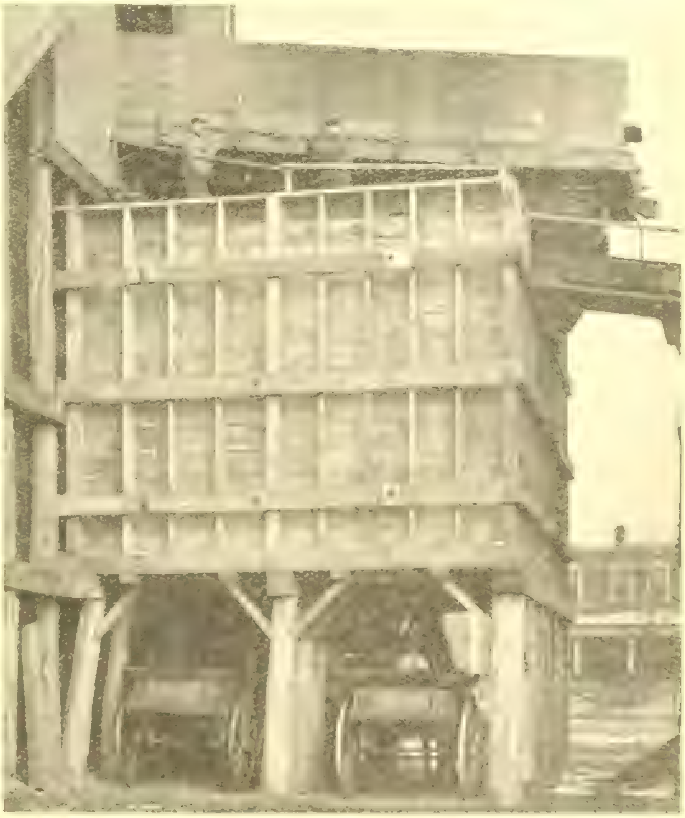
Perfect Brick Machine

The "Perfect" is an automatic brick machine of steel construction. Because of the rapidity, simplicity and durability of the work, and mechanical construction, the labor is lessened and the product manufactured at a minimum cost. The machine can be operated by either the hands or feet, or by both, the brick being released from the machine by one operation of the lever. The automatic tamper, which weighs sixty pounds, is practically lifted by an adjustable spring in the rear of the machine and can be adjusted to any stiffness the operator may desire, it not being necessary to lift one ounce of weight of the tamper, the spring doing it all. A mould of ten bricks can be molded by three strokes of the tamper operated by the foot, at which time the bricks are ready to be removed and set out to dry. It is claimed for this machine that it will manufacture more than a thousand brick an hour. It is the only machine having an adjustable automatic foot leverage whereby the brick can be tamped without the aid of the hands.

The machine will be in daily operation at the Cement Show. It is understood to be the intention of the inventor to manufacture shortly in Canada.

Facilities for Handling Crushed Stone

At certain periods last year there was an uncomfortable shortage of crushed stone in the Toronto market, and inasmuch as the present season promises considerably greater activity than last, it is opportune to mention the unique facilities possessed by the Rogers Supply Company, of Toronto, for supplying all parts of the city promptly. The company's yards are situated on the main line of the Grand Trunk and Canadian Pacific Railways, thus facilitating the ready switching and placing of cars, and handling of material. The delivery service is rendered still more expeditious by the chutes or bins erected at the various yards. As will be seen by the accompanying illustration, the stone, contained in hopper cars, is hauled up an incline and dropped into the bins for each size. It is then loaded into the contractor's wagon by simply pulling a lever. The advantage of such a system, compared with the common method of loading from cars, is at once apparent. The contractor can order his teams to the bins and is able to compute exactly how many trips will be necessary and what time will be involved in the work. Such a system should appeal strongly to contractors who have been accustomed to searching for their cars on public sidings and having to put up with the attendant delay and expense. The features of the Rogers Supply Company's service are an unlimited supply of stone, excellent car supply, and prompt delivery. The company have been handling the output of the Doolittle & Wilcox quarries in Toronto for some six years, during which time they have carried out many contracts.



Loading Crushed Stone into the Bin

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brandon, Man.

Tenders addressed to the city clerk will be received until March 17th for supply of the following goods: vitrified sewer pipe, 6-in., 8-in., 10-in., 12-in., 15-in., and junctions at price per ft., f.o.b. Brandon, freight and duty paid, all breakages to be allowed for, in carload lots; cast iron manhole cover; cast iron catch basins and covers. Also waterworks supplies—brass goods, corporation and curb cocks and specials; lead pipe; pig lead; fire hydrants; valves, 4-in., 6-in. and 8-in.; valve casings; serv ce boxes. Specifications, etc., at office of City Engineer, R. E. Speakman. Advertisement in this issue.

Carleton Place, Ont.

At a recent meeting of the Board of Trade and the Town Council, it was decided to correspond with the engineer who prepared the waterworks plan for the town some years ago to ascertain what improvements and changes he would suggest for the present as to the disposition of sewerage, etc., and the additional cost of construction.

Chapleau, Ont.

Tenders addressed to T. J. Godfrey, town clerk, will be received until March 27th for furnishing and erecting duplex steam pumping engine, capacity, 800 gals. per minute and one return tubular boiler. Chipman & Power, engineers, 204 Mail Building, Toronto; Geo. B. Nicholson, mayor. Advertisement in "Tenders and For Sale Department" of this issue.

Lethbridge, Alta.

T. Aird Murray, Toronto, is retained as consulting engineer for the installation of sewage disposal works here.

Niagara Falls, Ont.

Tenders are called until March 28th for construction of macadam roadway, etc. For further information see "Railroads," this issue.

Penticton, B.C.

See "Power Plants."

Peterborough, Ont.

Tenders addressed to S. R. Armstrong, secretary, will be received until March 10th for a quantity of timber at the watewrorks dam. Specifications at office of Mr. W. Henderson, superintendent.

Rouleau, Sask.

Tenders addressed to W. H. Stewart, sec.-treas., will be received until April 4th for the following: electrical machinery, pole line, etc.; pumping machinery, compressed air system; producer gas plant. Also mains, c.i. or steel water mains, tested to 300 lbs. hydro-c.i. water main, tested to 300 lbs. hydrostatic pressure; 1,000 ft. 4-in. c.i. water mains, tested to 30 0lbs. hydrostatic pressure; special castings, tees, etc. Also valves, hydrants, valves, etc., as follows: 22 6-in. hydrants, etc., 47 6-in. left-handed gate valves; 47 6-in. valve boxes extending 7 to 8 feet. Plans, etc., at office of the above or at office of J. Darlington Whitmore, consuling engineer, 104 Willoughby and Duncan block, Regina, Sask.

Toronto, Ont.

The Works Committee have provided for building of one thousand feet of sea wall this year and adopted city engineer's proposal to buy a quarry and gravel pit for his department's needs.

The Board of Control recommend the appointment of Mr. T. Aird Murray, consulting engineer; J. T. Sing, government engineer, both of Toronto, and Mr. J. Randolph, of Chicago, to act as a board of three experts to look into the whole waterworks system in Toronto, and bring in a report concerning the best means of meeting the city's need of pure water.

Vancouver, B.C.

The ratepayers will likely be asked in the near future to approve of a by-law authorizing the expenditure of about $500,000 on sewer extension work. W. McQueen, city clerk.

Victoria, B.C.

Tenders addressed to W. W. Northcott, purchasing agent, were called until March 3rd for constructing about 400,000 square yards of asphalt pavement.

Wilkie, Sask.

Tenders addressed to T. A. Dinsley, sec.-treas., will be received until March 20th for the drafting of plans and specifications for, and giving detailed estimate of the cost of electric lighting and waterworks systems for this municipality.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until March 29th for supply of quantity of c.i. water pipe to be delivered f.o.b. city yards. Specifications at office of City Engineer. M. Peterson, secretary.

Railroads, Bridges and Wharves

Fredericton, N.B.

Tenders are called by Department of Public Works until March 13th for rebuilding Ryan Brook Mouth Bridge, Studholm, King's Co. Plans, etc., at Public Works Department, at the office of Geo. B. Jones, Esq., M.P.P., Apohaqui, King's County, and at David W. McKnight's, Esq., Millstream, King's County, N.B.

Niagara Falls, Ont.

Tenders are called until March 28th for construction of (a) steel concrete bridges and (b) a macadam roadway with the necessary drainage, being section 4b, 5, 182 feet, etc. Plans, etc., at Administration Building, Queen Victoria Park. John H. Jackson, superintendent.

Ottawa, Ont.

This spring the C. P. R. will commence to make extensive improvements and additions to their round house beside the new Wellington street viaduct.

Vancouver, B.C.

The time for receiving tenders for clearing right-of-way on Mountain, Shuswap and Arrow Lake subdivisions of the C. P. R. will be extended from March 15 to April 15. H. Rindal, division engineer.

Tenders addressed to H. Rindall, division engineer, will be received until March 15th for clearing right of way on the mountain subway and Arrow Lake subdivisions of the C. P. R. Plans, etc., at the division engineer's office, Vancouver, B.C., also resident engineer's office, Revelstoke, B.C.

AWARDED

Calgary, Alta.

The city commissioners recommendation for the acceptance of tenders for the two new bridges over the Elbow were accepted. The Algoma Bridge Company and E. Ferndach were the successful tenderers. The cost is $75,200.

Montreal, Que.

The C. P. R. have placed orders for about $3,300,000 worth of rails, 100,000 tons with Consolidated Lake Superior Company, and about 10,000 tons with the Dominion Steel Company.

Quebec, Que.

The contract for the new bridge across the St. Charles river was awarded to Lemoine & Co., of Montreal. The new bridge will be of the bascule design, 150 feet in length. The contract was awarded with the provision that the corporation would attend to the Quebec approaches, which would cut off $12,000 from the original tender. Mr. Valle, consulting engineer.

Public Buildings, Churches Schools, etc.

Belmont, Ont.

Tenders addressed to M. L. Holmes, sec.-treas., will be received until March 25th for erection of red brick school house, S. S. No. 77 South Dorchester. Plans, etc., at residence of above; or at the office of N. R. Darrach, architect, St. Thomas.

Brandon, Man.

Tenders addressed to T. Sinclair, architect, will be received until March 11th for erection of new East Ward School. Plans, etc., at office of the above.

Calgary, Alta.

Tenders were received until March 7th for erection of St. John's church. Architects, Lang & Major, Board of Trade Building.

The city of Calgary will spend approximately $500,000 this year in the erection of new schools and improvements on those already erected.

Hamilton, Ont.

The I. O. O. F. are said to be planning the erection of a $50,000 building. Abner Fraser, secretary.

Tenders addressed to Adam Hunter, librarian, will be received until March 18th for the several works required in the erection of new public library, Main street. Plans, etc., at office of architect, A. W. Peene, 2 West King.

Leeville, Sask.

Tenders are called until April 15th for construction of Weybridge school house by Fred Clark, secretary - treasurer. Plans, etc., at office of the Beaver Lumber Company.

Michel, B.C.

Tenders are called by Public Works Department, Victoria, until March 20th for erection of new wing and sundry alterations to new Michel School. Plans, etc., at offices of E. K. Stewart, Esq., secretary of the school board, Michel, B.C.; the government agent, Fernie; and the Public Works Department, Victoria. F. C. Gamble, Public Works Engineer.

Micksburg, Ont.

Tenders addressed to H. T. Hawkins, sec.-treas., will be received until March 6th for erection of school house No. 5 Stafford.

Oak River, Man.

Tenders are called for $7,000 debentures for the municipality of Blanchard for erection of municipal hall here. G. McIntyre, sec.-treas., Oak River, Man.

Orillia, Ont.

The Presbyterian Building Committee although giving the plans of H. W. Angus, North Bay, the first prize, have not accepted them in their entirety. None of the eight plans submitted were suitable. It is stated that the floor plan submitted by Mayor Frost will likely be adopted as a basis. J. G. King, secretary.

Sarnia, Ont.

Tenders addressed to A. Kelly, House of Refuge, are called until March 15th for painting House of Refuge here.

South Middleton, Ont.

Tenders addressed to Geo. Fisher, secretary-treasurer, will be received until March 15th for reconstruction of school house, S. S. No. 7. Plans, etc., with above.

Simcoe, Ont.

The plans prepared for the Carnegie Library here have been approved by the Carnegie Library Trust. Specifications, it is stated, will be ready by middle of March, and tenders called for. Architects, Shepard & Calvin.

The congregation of St. Mary's R. C. Church are contemplating the building of a residence for their parish priest. L. D. Barber, Brantford, has been asked to prepare plans. It is proposed to locate the residence on the large vacant space just east of the church.

Toronto, Ont.

The plans for the improvement to Wycliffe College have been passed and work will be commenced at once. These will consist of a new chapel and principal's residence. Estimated cost, $40,000.

Permits were issued recently to Chester Baptist Church for Sunday School, corner of Danforth and Bowden, $13,000; Board of Education, school, southeast corner of Dufferin and St. Clair, $30,000.

Tenders addressed to H. F. McNaughten, secretary, public works, will be received until March 12th for additions and alterations required to building No. 5 Queen's Park. Plans, etc., at above Department. Advertisement in "Tenders and For Sale Department" of this issue.

Truro, N.S.

The council decided to erect a municipal building to cost about $20,000.

Vancouver, B.C.

The plans for the proposed pavilion for Stanly Park will call for stone construction instead of wood.

Tenders are called for erection of new pavilion in Stanley Park. O. W. Moberg, architect. Noted previously.

Welland, Ont.

According to a letter received by the public school board from B. J. McCormick, Industrial Commissioner, the rumors that a syndicate had been formed to erect at least 200 houses this year is correct. The letter further stated that this syndicate will donate a site of two acres on the condition that a new school is erected.

Whitemouth, Man.

Tenders are called until March 8th for plans and specifications for school and basement, 40 ft. x 50 ft., etc., value $5,000. Building material, frame, concrete, brick or stone. G. E. Saunby, secretary.

Winnipeg, Man.

Building permit was issued to A. R. McNichol for theatre on Main street, $12,000.

The time for receiving tenders for St. Charles Country Club has been extended to March 6th. Noted in last issue, under "Business Buildings."

The Bible Society board have decided to start a campaign to raise funds to build a Bible house to cost, with site, $60,000, towards which the parent society at London, Eng., will contribute the last $20,000.

The securing of the Fort Osborne barracks site, which adjoins the present Parliament Buildings, to permit of the building of a new legislative hall has been abandoned for the time being. Hon. R. Rodgers, Minister of Public Works.

AWARDED

Foldens, Ont.

James A. Edwards, Ingersoll, has been awarded the contract for erection of brick church here, $5,075. H. Pocock, London, architect.

Nelson, B.C.

The contract for the building of the isolation hospital has been let to John Burns & Son and the work will be proceeded with immediately, $885.

Notre Dame de Lourdes, Man.

The [illegible] was destroyed by fire [illegible] Homer street, $60,000

Toronto, Ont.

The contract for the construction of the Woman's building at the Exhibition grounds has been awarded to Wickett Bros., $59,978. The estimate pslaced it at $67,000.

Vancouver, B.C.

The contract for erection of proposed extra wing to the new court house on Georgia street has been awarded to McDonal & Wilson, contractors, at a figure of $348,200.

North Vancouver, B.C.

Contract for the construction of the municipal hall building on the Lynn Valley road was awarded to H. W. Young & Sons, $8,395.

Residences

Regina, Sask.

Henry Black, contractor, will move the old building on Hamilton street once used as a church, and on the site will erect a 3-storey apartment building at a cost of about $30,000.

Victoria, B.C.

Permits were issued recently to R. L. Spragge, dwelling on Albany street, $2,100; Capt. James Hunter, dwelling on St. Andrew's street, $2,700; George E. Handley, dwelling on Cedar Hill road, to cost $4,000.

Winnipeg, Man.

Tenders addressed to J. H. G. Russell, architect, McArthur Building, will be received until March 10th for erection of a two family residence on Dorchester street for Mr. J. D. Windrum.

Tenders are called for excavating for an apartment building, according to plan and specification at 794 Victor street.

Tenders addressed to E. D. Tuttle, architect, 701 McArthur Building, will be received until March 13th for erection of residence for Mr. A. A. Miller, Horn street.

Pratt & Ross, architects, have drawn plans for the private residence for Sir D. H. McMillan, lieut.-governor, and are calling for tenders.

Building permit was issued to A. P. Johnston, 796 Victor street, for apartment block on Agnes street, $50,000.

AWARDED

Brockville, Ont.

The contract for addition and alterations to residence of H. A. Stewart, K.C., has been awarded to W. E. Brown, Brockville.

Calgary, Alta.

The following contracts were awarded in connection with the residence erected for Col. James Walker; general contract, [illegible] & [illegible]; plumbing, E. J. Young, $2,000. Lang & Major, architects.

Nelson, B.C.

The contract for the [illegible] in connection with the erection of apartment block on [illegible] street for M. Kerr has been awarded to Eric Palm [illegible]

Business Buildings and Industrial Plants

Basswood, Man.
The Holmstrom block here was destroyed by fire on the 3rd inst. Estimated loss on building, about $4,000

Belleville, Ont.
Marsh & Henthorn, Ltd., manufacturers of hoisting engines and boilers, are seeking a location, their new plant having outgrown their present premises.

Brandon, Man.
Tenders addressed to Shillinglaw and Marshall, architects, 831 Rosser avenue, are called for erection of 3-storey building for Mr. J. Burchill, this city.

Calgary, Alta.
A company to operate and erect a large linseed milling plant in the west has been organized. Address Western Agencies and Development Co., Ltd.

Cupar, Sask.
The Beaver Lumber Company's store, Beaches' hardware store and other buildings were destroyed by fire on the 5th inst. Estimated loss, $50,000.

Edmonton, Alta.
The Edmonton Concrete Company will erect a mirror plant in connection with their glass works on York street at a cost of $30,000.

The Bank of British North America intend next year to erect a large business block on the site purchased recently. In the meantime they are looking for temporary premises. G. F. Laing, manager, Calgary branch. Noted in issue of December 7th.

Fort William, Ont.
Fifty feet frontage has been purchased by Sir Robert Usher, Edinburgh, Scotland, which it is thought signifies the erection of a building.

Guelph, Ont.
A modern abattoir will be constructed here by Mr. A. Barber at a cost of about $10,000.

Montreal, Que.
It is reported that an English syndicate represented here by Mr. E. H. Ford, of the Ford Iron Company, will establish a chain of summer hotels throughout the Dominion, beginning at Senneville. Other places mentioned are Toronto, Ottawa, Vancouver, and Winnipeg.

The building to be erected for Messrs. Henry Morgan & Co., on St. Catherine street, between Mance and Balmoral streets, will be eleven storeys high with basement of steel and reinforced concrete. The building was designed by Mr. J. H. McDowell, with H. Morgan & Company.

A building permit has been asked by Mr. Peter Lyall for the erection of the National Bridge Company's building, in Longue Point Ward. The building will cost $300,000 and is to be used as a foundry where structural steel and bridge material will be manufactured. Construction has been started.

New Westminster, B.C.
H. G. Allen, representative of the Compressed Gas Co., of Seattle, has been here looking for a possible location of a plant to manufacture acetylene gas.

The British Columbia Steel Corporation has received its Dominion charter, capital, $10,000,000. The plant will be erected on the Fraser river, near here. A. P. Gibbs, is interested.

New Dublin, Ont.
The store of J. S. Ransom, general merchant, was completely destroyed by fire on 1st inst. Loss, about $12,000.

Owen Sound, Ont.
On the 25th inst. the ratepayers will vote on the by-law to loan $30,000 to a company proposing to erect a knitting factory (50 x 100). A. D. Lake and G. A. Ward represent the company.

A dairy company, lately incorporated, will erect a dairy building, stone or cement, and stables on 3rd avenue. The charter members comprise C. Bleich, A. Nicol and P. Harwood, etc.

Regina, Sask.
Negotiations as to the location here of a nail factory from the east to handle the western trade, are reported. Commissioner of Industries, Sheffield.

Richmond, Que.
The Dunton Block, Main street, was completely destroyed by fire on the 1st inst. Total loss, $25,000.

Sandwich, Ont.
The United States Steel Corporation is reported to be considering the erection of a plant here.

Simcoe, Ont.
Mr. E. T. Arnoldi, architect, of the firm of Langley & Howland, Toronto, is in charge of the proposed extension to the Molsons Bank here.

St. Thomas, Ont.
Architect John Findlay, successor to N. R. Darrach, is preparing plans for the erection of a two-storey store for Frank Goodwin, furniture dealer, on Talbot street.

The Merchants Bank has purchased the four-storey building at the corner of Talgot and Hincks street, and will, as soon as possible, convert it into an office building.

Sydney, N.S.
The I. C. R. station was damaged on the 1st inst. Total loss, about $60,000.

The architects are preparing plans for the new Bank of Commerce branch, corner of Charlotte and Dorchester streets. E. B. Ireland, manager.

Vancouver, B.C.
A building permit was granted to W. D. Rorison for large warehouse on Homer street, $60,000.

Victoria, B.C.
The sketch for the proposed combination theatre, hotel and office building on the site of the Spencer block shows a large structure of ten-storeys to cost about $1,000,000. Mr. J. W. Weart is in charge of the project; H. S. Griffiths, architect.

The British Columbia Telephone Company have decided upon the erection of a new four-storey fireproof exchange building to cost $65,000, at the corner of Johnson and Blanchard streets. It is the intention to have it completed by September. Thos Hooper, architect.

Wallaceburg, Ont.
A new hotel will be erected here. Those interetsed are Chas. Dupont and Captain Moran, Marine City, Mich.

Winnipeg, Man.
Tenders were called until March 2nd for erection of 3-storey and basement addition to building on Douglas street for Messrs. Smith & Champion. C. Elwood Watkins, architect.

Messrs. G. Gale & Sons, manufacturers of iron and brass bedsteads, will erect on the property recently purchased by them on Higgins avenue, a factory to cost about $50,000. Mr. Turner is local manager.

Windsor, Ont.
O. R. S. Traber, Fullerton Building, St. Louis, Mo., is preparing plans for a 2-storey factory, 100 x 150 ft., for the Maloney Electric Co., cost, $30,000. Noted in issue of February 22.

AWARDED

Chatham, Ont.
The Dowsley Spring & Axle Company have let a contract to the Blonde Manufacturing Company for extension to their present plant (135 ft. x 46). Estimated cost, $15,000.

Ottawa, Ont.
The contracts for erection of shops, etc., for W. J. & R. Spratt, have been awarded as follows: Stone and brick and concrete, C. & W. N. Lester; F. A. Wilson, carpenter work; painting and glazing, Ritchie & Nunn; estimated cost, $8,000. Jas. E. Wilson, Ottawa, architect.

Welland, Ont.
The Builders' Lumber & Supply Co. have been awarded the contract for the construction of Goodwin & Ross' new 3-storey business block on East Main street. This contract covers all but the steel work, which was awarded to the Hamilton Bridge Co. Work will be completed in July.

Power Plants, Electricity and Telephones

Brudenell, Ont.
At the last meeting of council a by-law was passed authorizing the Eganville and Brudenell Telephone Co. to erect and maintain a telephone line on the highways of the municipality.

Calgary, Alta.
The city will have to put in a new claim, with maps and plans, for the right to dam the Elbow river for domestic water purposes. No previous priority of claim for power will be considered.

Kincardine, Ont.
Tenders addressed to Mr. D. McNaughton, President Bruce Municipal Telephone System, Underwood, Ont., will be received until March 18th for construction of telephone system in the Townships of Bruce, Saugeen, Greenock, Kincardine and Elderslie, Co. of Bruce. Plans, etc., at office of W. L. Bland, Kincardine, Ont., and at office of the Engineer, Geo. J. Beattie, 72 Victoria street, Toronto.

Magog, Que.
An electric lighting and power plant will be installed here this summer. Specifications prepared by Messrs. Ross & Holgate, Montreal.

Ottawa, Ont.
The municipal electric commission here decided to ask the city council to

request the hydro-electric commission to investigate, and take steps to secure for Ottawa a water power either in Ontario or Quebec.

Penticton, B.C.

F. H. Latimer, C.E., writes re installation of water, light and power at Penicton that plans, etc., will be ready in about four weeks' time for iron and steel pipe fittings for water work. The power development is hydro-electric and require extensive surveys in mountains which cannot be done until snow is off. There will be about five miles of concrete conduit, the pressure pipe being under a maximum static head of about 2,100 feet, 200 kw. generator being installed at first probably in two units.

Porcupine, Ont.

This municipality is to have electric light and power as soon as possible. Messrs. Ross & Holgate, Montreal, have prepared plans and estimates for the plant and tenders were asked for during the first week in March. The mines as well as the town will be supplied with power and lighting.

Quebec, Que.

Tenders are called until March 25th by Quebec Railway, Light and Power Company for construction of about three and a half miles of double track railway from Beauport to Kent House Park. Plans, etc., at office of above, 140 St. John street. C. E. A. Carr, general manager.

Rouleau, Sask.

See "Waterworks."

Saskatoon, Sask.

Tenders addressed to Jas. Clinskill, and W. B. Neil, city commissioners, will be reecived until March 27th for supply of the following: A 150 kw. 2,200 volts, 60 cycle, 120 r.p.m., 2 phase generator, exciter, installed complete. Alternative tenders for the above are asked for in three phase (B) 1,250 h.p., 120 r.p.m., vertical cross compound Corliss engine with condensing apparatus and feed water heaters, installed complete. C direct connected exciter engine to run exciter for 750 kw. generator, installed complete; D. one steel smoke stack with a height of 100 feet and inside diameter of 80 inches with connections, etc. Jas. Clinskill, mayor.

St. Vital, Man.

The application of the Manitoba Rural Railway Company for permission to run an electric line through the municipality, after several changes had been ordered in the original draft, was passed. Ratification of legislature still required. This agreement calls for the construction of electric railways through the municipality from Winnipeg and St. Boniface southward on both sides of the river, etc.

Toronto, Ont.

Tenders addressed to Chairman, Board of Control, will be received until March 14th for electric vehicles. Specifications obtained from Hydro-Electric System, City Hall.

Tenders addressed to G. R. Geary, Chairman, Board of Control, will be received until March 14th for pipe fittings in connection with street lamps. Specifications at Hydro-Electric System, City Hall.

Wilkie, Sask.

Tenders addressed to T. A. Dinsley, secretary-treasurer, will be received until March 20th for the drafting of plans, etc., of the cost of electric lighting, etc., for this municipality.

AWARDED

Calgary, Alta.

The city commissioners have recommended the accepting of tenders for about two hundred lamps of the same pattern as adopted in Toronto. Five globes are on each lamp post and the iron work is arranged very ornamentally. The Canadian Equipment Company and the Canada Foundry Company are the successful tenderers. The tota lcost will be $11,400. Each company will supply half the number of lamps.

Vancouver, B.C.

The Canadian General Electric Company were awarded the contract for supplying 2,000 tungsten lamps for the Granville standards at $1.25 per light. The Northern Electric Company submitted a tender of $1.28 on the same lamp for a similar quantity.

Miscellaneous

Calgary, Alta.

Tenders addressed to W. D. Spence, city clerk, will be received until March 14th for supply for the year1911 of general hardware, electric light materials, tools, packing, waste materials, pipe fittings, etc. Specifications, etc., at office of City Commissioners.

Toronto, Ont.

Recent building permits include: J. H. Lennox, 2 det. and 1 pr. semi-det. 2-storey brick dwellings on Hartford ave., $8,000; Rev. Geo. Brown, 1 pr. semi-det. 2½-storey brick dwellings on north side Gloucester street, $9,000; J. J. Downey, 1 pr. semi-det. 2-storey brick dwellings on east side Indian road, $4,000; J. E. Merkens, 2 det. 2-storey and attic brick dwellings on Summerhill avenue, $10,000; A. W. Reid, 2-storey brick apartments, corner Albany and Wells, $10,000; M. A. Hunter, 1 pr. semi-det. 2-storey brick dwellings on St. Helens avenue, $4,000; Geo. Liddiard, 3 att. 2-storey brick dwellings, northwest corner Wyndham and Brock, $6,000; Dr. H. L. Bartlam, 3 att. and 1 pr. semi-det. 2-storey roughcast dwellings, brick fronts, on Dovercourt road, $7,000; W. J. Griffiths, 2-storey and attic brick dwelling near Indian road, Wright ave., $4,000; B. Kent, 2½-storey brick dwelling, near Bernard ave., Admiral road, $7,000; R. E. McDonagh, 2 det. 2½-stoeyr brick dwellings on Sunny side and Wright, $7,300; McGee Estate, alterations to theatre, near King on Yonge street, $8,000; H. M. King, 2 det. 2½-storey brick dwellings near Garden on Glendale, $5,400; A. G. Saunders, 2-sty. and attic brick addition to 1 pr. semi-det. brick dwellings, 48-50 Lappin ave., $4,000; S. G. Smith, 1 pr. semi-det. 2-storey brick dwellings on east side Perth avenue, $4,000; John S. Wren, 2 pr. semi-det. 2-storey brick dwellings in south side Withrow ave., $8,000; R. Dale, 2 pr. semi-det. 2½-storey brick dwellings, 1[illegible], 15, 17, 19 Dupont street, $12,000; T. H. Wylie, 2 det. 2-storey brick dwellings, on Law street, $5,000; Thos. Edwards, 3 att. 2-storey brick dwellings on southeast cor. Symington and Paton, $6,000; W. C. Stevens, 1 pr. semi-det. 2-storey brick dwellings near Dundas, on north side Kenneth, $5,400; Frank Phillips, 1 pr. semi-det. 2½-storey brick dwellings on 411-3 Brunswick avenue, $8,000; J. G. Vale, 1 pr. semi-det. 2½-storey brick dwellings near Garnock, on west side Logan ave., $4,500; Samuel Dennis, 1 pr. semi-det. 2½-storey brick dwellings near Rideau, on east side Lansdowne, $4,500; C. H. J. Snider, 2½-storey brick dwelling on east side Keele street, $4,000; J. & T. H. Bishop, 1 pr. semi-det. 2½-storey brick dwellings on north side Wright ave., $4,500! D. McLennan, 1 pr. semi-det. and 1 det. 2-storey brick dwellings, cor. West Lodge and Marion, $6,750; James Sercombe, 4 pr. semi-det. 2-storey and attic brick dwellings on north side Gibson, $16,000.

Vancouver, B.C.

Among the building permits were two taken out by Bentley & Wear covering extensive building operations in Kitsilano, for eight residences on Seventh avenue west, near Macdonald street, at a cost of $24,000; another was issued to Mr. A. Mackenzie who will erect a business block at 1815 Park drive, $10,000.

Other permits were taken out as follows: S. N. McLeod, 2525 Third avenue west, $3,200; J. G. Gray, 2156 Eleventh avenue east, $2,000; D. A. McIntosh, 1228 Park Drive, $6,600; E. E. Crandall, 1126 Twelfth avenue west, $4,500; Mrs. Mackenzie, 1145 Tenth avenue west, $5,500; W. H. Harcus, 463 Thirteenth avenue west, $3,500; A. Mathason, 1439 Tenth avenue east, $2,200; Carmichael & Herbert, 2922 Third avenue west, two houses, $4,400; H. Green, 2116 Seventh avenue east, $2,000; Braithwaite & Glass, 2830 Third avenue west, $2,500; D. Acorn, 1329 Stephen street, four houses, $8,000.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until March 15th for supply of hardware and rubber goods required for the season of 1911. M. Peterson, secretary.

AWARDED

North Toronto, Ont.

The Elias Rogers Supply Company were given the contract at $1.25 per ton for crushed stone.

Business Notes

A. V. Campeau, plumber, Montreal, is stated to have assigned.

Eastern Paper Co., Ltd., St. Basile, Que., have registered.

H. Cauchon & Co., contractors, Beauport, Que., have registered.

The Builders Sand Company, Montreal, Arthur Laing, has registered

Nicholson & Barry, plumbers, etc., Montreal, are stated to have dissolved

Ford, Rolland & Son, manufacturers of paper, Portneuf, Que., have registered.

Jos. Belisle & Frere, plumbers, Montreal, Que., are stated to have dissolved

[illegible] Knowlton, Que., are stated to have assigned. .

Belding Lumber Company, Limited, Toronto, assets advertised for sale by tender.

W. Arnold Smith, electierian, Sarnia, Ont., is stated to have assigned to Marshall A. Saunders.

Tenders and For Sale Department

To Contractors

Tenders will be received at the office of the Secretary, School of Mining, Kingston, up to 6 p.m. of Friday, **March 10th**, for the several trades works required in the erection and completion of the Nicol Building for the Governors of the School of Mining and Agriculture.

Plans and specifications may be seen at the University and at the office of the undersigned.

The lowest or any tender not necessarily accepted.

POWER & SON, Architects,
9-10 Merchants Bank Chambers, Kingston.

Chapleau Water Works

Pumping Machinery

Sealed tenders will be recevied by the Town Clerk until 8 p.m., on **Monday, March 27th, 1911**, for furnishing and erecting Duplex Steam Pumping Engine, with a capacity of 800 gallons per minute, and one Return Tubular Boiler.

For further information apply to the engineers.

GEO. B. NICHOLSON, Esq., Mayor,
Chapleau, Ont.

T. J. GODFREY, Town Clerk,
Chapleau, Ont.

CHIPMAN & POWER, Engineers,
10-10 204 Mail Building, Toronto.

For Sale—Second Hand

No. 8 Austin Gyratory Crusher.
No. 6 and No. 3 Austin complete plant.
No. 3 Austin and 2 No. 6 Gates and No. 5 "B."
70-ton Vulcan Steam Shovel, 2-yard.
50-ton Bucyrus Steam Shovel, 1¾-yard.
Loco. Crane, with 1¼-yard Clam Shell.
Little Giant Traction Steam Shovel, 1¼ yard.
Hayward Orange Peel Buckets, 1 and 1¼-yd.
Concrete Mixers, Steam Rollers, Air and Steam Drills, Air Compressors, Locomotives, Dump Cars, etc.

All our goods we fully guarantee.
Send for our February Booklet.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

City of Moose Jaw, Sask.

Tenders for

Garbage Wagons, etc.

Sealed tenders, endorsed "Health Department," will be received by the undersigned City Clerk until 8.30 o'clock p.m., on **Monday, March 20th, 1911**, for the following apparatus:

Wagons made of steel or other material, and tanks suitably designed for conveying ashes, garbage and all materials collected and removed under the supervision of the Health Department.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, March 1st, 1911 10-11

Tenders Wanted

The Town of Petrolia intends to construct about 6,000 square yards of pavement, and about 2,500 lineal feet of concrete curb and gutter combined, and invite tenders for Vitrified Brick, and any other kind of pavement.

Parties tendering must enclose a specification of the pavement they purpose laying along with their tender.

Tenders to be placed with me on or before 5 p.m., **Monday, March 20th, 1910.**

Any tender not necessarily accepted.

9-10 J. McHATTIE, Town Clerk.

City of Toronto

Civic Car Lines

Tenders for Rail & Ties

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, April 4th, 1911**, for delivery of Thirteen hundred and forty (1340) tons of open hearth steel rail, 80 lb. section, also thirty thousand (30,000) untreated wood ties, white cedar preferred, although other woods will be considered.

Envelopes containing tender must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained upon application to the office of the City Engineer, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor)
Chairman, Board of Control.
City Hall, Toronto, Feb. 23, 1911, 9-11

RIDEAU CANAL

Notice to Contractors

Sealed tenders addressed to the undersigned, and endorsed (a) "Tender for Timber," or (b) "Tender for Timber and Plank," will be received at this office until 16 o'clock on **Monday, the 20th March, 1911**, for the supply and delivery of British Columbia or "Douglas Fir" dimension timber and also for other Lumber and Timber required for use on the Rideau Canal for the year 1911-1912.

Specifications, Bills of Timber and full information can be obtained from the Purchasing Agent of the Department of Railways and Canals, Ottawa, on and after this date.

The lowest or any tender not necessarily **accepted.**

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa,, 22nd February, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 9-10

City of Moose Jaw, Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A" and "Tender B" will be received by the undersigned City Clerk until 8.30 o'clock p.m., on **Monday, April 10th, 1911.**

Any tender received after the above-stated time will be declared informal.

Contract "A."

Supplying material for and constructing a Sewage Disposal Plant complete, including Pump House, Sedimentation Tanks and Percolating Filter, also the supply of materials for and the laying of a Trunk Sewer and Water Main.

Contract "B."

Supplying two Electrically Driven Centrifugal Pumps and Auto Starters complete with all piping, connections, etc.

Plans and specifications for Contract "A" may be obtained from the City Engineer, Moose Jaw, upon receipt of a marked cheque for the sum of $25 to be held until the return of plans and specifications, and for Contract "B" plans and specifications will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 18th, 1911. 9-14

City of Moose Jaw, Saskatchewan

SEWER AND WATER EXTENSIONS

Sealed tenders endorsed "Tender 28," "Tender 29," "Tender 30" and "Tender 31," will be received by the undersigned City Clerk until 8.30 o'clock p.m. on **Monday, April 10th, 1911.**

Any tender received after the above stated time will be declared informal.

Contract 28.—The laying of approximately 30,700 lin. feet of tile pipe sewer, building manholes, etc.

The laying of approximately 29,700 lineal feet of cast iron water main, placing valves, valve boxes, hydrants, etc.

Contract 29.—The supplying of approximately:
29,600 lineal feet of 6-in. c.i. water pipe.
112 lineal feet of 4-in. c.i. water pipe.
132 6-in. cast iron **reverse curves.**
34 6-in. cast iron crosses.
72 6-in. cast iron tees.
29 4-in. off 6-in. cast iron tees.
28 4-in. cast iron tees.
95 6-in. cast iron plugs.

Contract 30.—The supply of approximately:
26,600 lin. feet of 8-in. vitrified tile sewer pipe
5,225 lin. ft. of 10-in. vitrified tile sewer pipe.
1,100 lin. ft. of 12-in. vitrified tile sewer pipe.
25 8-in. tees.
75 6-in. tees.
25 8-in. bends, 90 deg.
100 6-in. ⅛ bends, 90 deg.
25 8-in. stops.
25 10-in. stops.
400 4-in. to 6-in. increasers.

..Contract 31.—The supply of approximately:
65 6-in. 3-way hydrants.
147 6-in. gate valves.
29 4-in. gate valves.
150 6-in. valve boxes.
29 4-in. valve boxes.
88 manholes, frames and covers.

Plans and specifications for Contract 28 may be obtained from the City Engineer, Moose Jaw, and from the offices of the Canadian Engineer at Toronto and Winnipeg.

Plans and specifications for Contracts 29, 30, and 31 will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 24, 1911. 9-14

Machinery for Sale

For sale or rent 20 horsepower double drum hoisting engine; Ransome Concrete Mixer with loading hopper; also set of metal forms for 5-foot concrete pipe; also other miscellaneous plant. Address, Box 235, Contract Record, Toronto, Ont. 10-10

Sand Dredge for Sale

Hydraulic Sand Dredge in excellent condi[illegible] boiler, "A" frame, spud cutter, etc.

Accessories include 500 feet of steel discharge pipe, of which 250 feet is fitted with flexible joints; also seven pontoons to carry same.

For further information and details apply to the City Engineer of Hamilton, Canada.

Hamilton, Canada, March 1st, 1911. 10-11

Tenders addressed to the undersigned and endorsed "Tender for Alterations," will be received at this Department until noon on **Monday, March 12th, 1911**, for the additions and alterations required to building, No. 5 Queen's Park, Toronto.

Plans and specifications can be seen at this Department. An accepted bank cheque, payable to the order of the Hon. J. A. Reaume, Minister of Public Works, for five per cent. of the amount of the tender, and the bona-fide signatures and addresses of two sureties, or the bond of a guarantee company approved by this department, must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tenderer refusing to carry out the work within ten days after the acceptance.

The Department will not be bound to accept the lowest or any tender.

By order,
H. D. McNAUGHTEN,
Secretary Public Works, Ontario.
Department of Public Works, Ontario.

Toronto, March 2nd, 1911.

Newspapers publishing this advertisement without authority will not be paid for it. 10-10

Temiskaming & Northern Ontario Railway Commission

Sealed tenders, addressed to the undersigned, will be received up to 12 o'clock noon, on **Wednesday, March 22nd, 1911**, for all works in connection with the construction of a passenger station at Matheson. Tenders to be marked on envelope "Passenger Station at Matheson."

Plans and specifications may be seen at the office of the architect, J. M. Lyle, 14 Leader [illegible] the Chief Engineer in North Bay.

Certified cheque on a chartered bank of Canada, payable to the order of the Secretary-[illegible]

[illegible]

A. J. McGEE, Sec.-Treas.,
[illegible]

[illegible] 1911.

[illegible] 10-11

City Engineer Wanted

For city of 15,000 population. Considerable permanent street work to be done. Apply, stating experience and salary wanted, Box 230, Contract Record, Toronto, Ont. 9-10

City of Brandon, Man.

March 2, 1911.

Sealed tenders, which must be endorsed "Tender for Supplies," will be received by the City Clerk, Brandon, Manitoba, until 12 o'clock at noon on **Friday, the 17th day of March, 1911**, for the following goods:—

Vitrified sewer pipe, 6-in., 8-in., 10-in., 12-in., 15-in., and junctions at price per foot f.o.b. Brandon, freight and duty paid (all breakages to be allowed for). In carload lots.

Cast iron manhole covers.
Cast iron catch basins and covers.

Water Works Supplies.

Brass Goods—
Corporation and curb cocks and specials.
Lead pipe.
pig lead.
Fire hydrants.
Valves, 4-in., 6-in., 8-in.
Valve casings.
Service boxes.

Specifications and further particulars can be obtained from the City Engineer's office.

All goods must be the best quality of their respective kinds.

The lowest or any tender not necessarily accepted.

R. E. SPEAKMAN,
City Engineer.

Brandon, March 2, 1911. 10-11

Town of Rouleau, Sask.

TENDERS

Sealed tenders addressed to W. H. Stewart, Secretary-Treasurer, will be received in the council chamber, up to 12 o'clock noon, on **April 4th, 1911**, for the following:—

"Contract E."—Electrical machinery, pole line, etc.

"Contract F."—Pumping machinery, compressed air system.

"Contract G."—Producer Gas Plant.

"MAINS."

Cast iron or steel water mains, as follows:—

12,000 feet 6-inch c.i. water main, tested to 300 pounds hydrostatic pressure.

1,000 feet 4-inch c.i. water mains, tested to 300 pounds hydrostatic pressure.

1,400 feet 2-inch c.i. water main, tested to 300 pounds hydrostatic pressure.

Special castings, tees, etc., at per pound.

"VALVES."

Hydrants, valves, etc., as follows:—

22 6-in. hydrants, one steamer nozzle, and two 2¼-inch nozzles; 8 feet 0-inch bury.

47 6-inch left-handed gate valves.

47 6-inch valve boxes extending 7 to 9 feet.

An accepted cheque equal to five per cent. of the amount of the tender must accompany each tender and envelopes must be endorsed with the letter of the contract referred to, or "Mains" and "Valves."

The council reserves the right to reject any or all tenders, and to waive any irregularities therein.

Plans and specifications may be seen at the Secretary-Treasurer's office, Rouleau, or at the office of the Engineer, Regina.

Plans and specifications will be forwarded [illegible] for $10, said cheque to be refunded upon return of the said plans and specifications.

[illegible] WHITMORE,
Consulting Engineers,
[illegible]

J. H. CRAIG, Mayor.
W. H. STEWART, Sec.-Treas.

CRANES

For sale—McMyler derricks and Brown-Hoist locomotive cranes, equipped for clamshell buckets, hoisting engines, derricks, centrifugal pumps, diving riggs, vulcan steam hammer, 60-ton shovel, clamshell, everything almost new, guaranteed, located in Canada, must be sold by receiver to wind up.

WM. RUDDOCK,
10-10 Rose Bldg., Cleveland, Ohio.

Machinery for Sale

One Smith Concrete Mixer, one-third yard capacity, wit uhpright engine and boiler complete; two No. 6 Smart-Turner centrifugal pumps, 8-in. suction, capacity 1,050 gals. per minute; No. 5 Beatty Pump, capacity 700 to 900 gals., all necessary attachments, including foot valves. Also No. 1 Willson Flare Light (new); and 10 ft. x 12 ft. tarpaulin. Prices on application.

Canadian Contracts, Limited, Toronto,
10-10 61 Canada Life Building.

New Companies

The Crescent Copper Ore Company, Limited, Victoriaville, Que., incorporated, capital, $19,000. Incorporators, L. G. Heon, trader, and J. C. A. Bordeleau, both of Victoriaville.

La Compaigne de Ciment Asphalte et Construction Limitee, Montreal, incorporated, capital, $100,000. Incorporators, R. T. Beaudoin, Village des Laurentides, and J. E. Desjardins, Ste. Therese, notaries.

,La Compagnie Electrique et de Ciment de Drummondville, Drummondville, Que., incorporated, capital, $100,000. Incorporators, H. Vassal and A. Mercure, manufacturers, N. Pelletier, contractor, all of Drummondville.

The Rocmac Road Company of Manitoba, Limited, Winnipeg, Man., incorporated, capital, $100,000. Incorporators, W. A. Preston, lumberman, Fort Frances, W. Blackwood, manufacturer, Winnipeg, F. H. Keefer, barrister, and E. A. Paterson, mining engineer, all of Port Arthur.

E. J. Maxwell, Limited, Montreal, capital, $100,000, incorporated to carry on the business of lumbering, etc. Incorporators, G. W. Macdougall, K.C., Lawrence Macfarlane, C. A. Cartwright, accountant, all of Montreal.

The National Brick Company, Limited, Brandon, Man., incorporated, capital, $20,000. Incorporators, G. Ruller and S. Lyle, contractor, both of Brandon.

Business Notes

R. J. W. Fisher, hardware meerhant, Chesley, Ont., is stated to have assigned

W. Arnold, electrician, Sarnia, Ont., is stated to have assigned to Marshall & Sanders.

The B. C. Gazette gives notice of the incorporation of the following companies: The Alberni District Electric Light & Power Company, Limited, capital, [illegible] Consolidated [illegible] Heaters, Limited, capital, $100,000; Coast [illegible] Brick Company, Limited, capital, [illegible] Vancouver Pressed Brick and Stone, Limited, capital, $100,000.

Builders' and Contractors' Supplies

Portland Cement, Lafarge Cement, Gravel, Sand, Rubble, Imported and Canadian Pressed Brick for front work and fireplaces.

CRUSHED STONE—Dimension and Coursing Stone, Lime

FIRE BRICK **IVORY CEMENT PLASTER**

—Yards—

75 Brock Ave., Jarvis Street Wharf,
Avenue Rd., & C.P.R. 355 Eastern Ave.

The Contractors' Supply Co., Limited
Manning Chambers, Toronto Tel. M. 6859

Tender

A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

Special Mantles
Stair Cases
Panelling
Veneered Doors
Glass Partitions
Bank Fittings
Office Fittings
House Fittings

: OUR WESTERN AGENTS :—

E. V. Alburty,
Dominion Trust Bldg.
Vancouver, B.C.

J. Malcolm-Suttie,
Travellers Building,
Winnipeg, Man.

Saskatoon Forwarding & Storage Co.
Saskatoon,
Saskatchewan

Walker & Barnes
Edmonton,
Alberta

Lickley's Ltd.
Mail Building
Phone Main 3166 TORONTO

We Manufacture

Frames - Sash - Doors

House Trim Finest Quality Hardwood Flooring High Class Interior Work

Our Arguments for soliciting your business are excellent

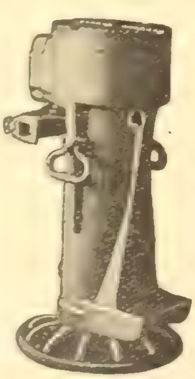
New and up-to-date Lumber Dry Kilns, of 200,000 ft. capacity. New and well equipped factory with latest and best machinery. Experienced workmen under the most expert supervision. :: ::

Give us a trial order
Our work will convince you

Georgian Bay Shook Mills
Limited
Midland, Ontario

THE H. & E. PATENT BALL-BEARING LIFTING JACKS

For Railway and Bridge Work, Contractors' and Builders' Use



Made by practical Jack Builders. Material: best grades of malleable iron and steel. Fully guaranteed as to durability and efficiency. The long even stroke of the lever, together with the design and careful construction of the jack, makes it the quickess and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

To any responsible Firm or Railway in Canada any of these jacks will be sent on 30 days trial.

Manufactured by
H. & E. Lifting Jack Company
Waterville, Que.

Stock carried by F. H. Hopkins & Company, Montrea

Permanent Waterproofing of Concrete

The continual expansion and contraction of a concrete surface, due to varying temperature, will in short time shed its waterproofing compounding whatever it is.

Make your concrete waterproof right through by incorporating in your mixture

Guelph Hydrated Lime

which is very fine and fills all voids.

It improves the appearance of your job by producing a better color and it lessens the cost because it is cheaper than cement.

Specify **Guelph Hydrated Lime** when ordering from your dealer.

Standard White Lime Co.
Guelph - Ontario

"The durability of a building is the gauge of its value from an economic standpoint."
—The Philosopher of Metal Town.

Absolute perfection in workmanship and quality of material used is the reason for the superiority of our

Corrugated Sheets

Only the best quality COLD ROLLED steel is used—a much tougher and finer material than the hot rolled article.

Each sheet is accurately squared and the corrugations PRESSED one at a time—not rolled—giving an exact fit without waste.

Specify our corrugated sheets and know that you are getting the best—the strongest and most durable on the market.

Flat or curved—galvanized or painted. Any size or gauge

Our special prices on car lots will interest you. Send for our new catalogue No. 70—it contains interesting information on Metallic Building Materials.

Manufacturers 1958

The Metallic Roofing Co Limited
TORONTO & WINNIPEG

All International Varnish Products are Sold in full Imperial Measure Cans

That means more satisfaction and better goods for your customers at the same money. Their satisfaction means trade insurance—A permanent clientele for you.

Many prominent architects are kind enough to say that all International Products are hall-marked "Superior Quality."

Be that as it may, when you specify International Products your reputation is protected as far as the ingenuity and experience of any manufacturing concern can protect.

Secure our new album of Superior Finishes and judge for yourself.

Specify the following International Products in the contract:

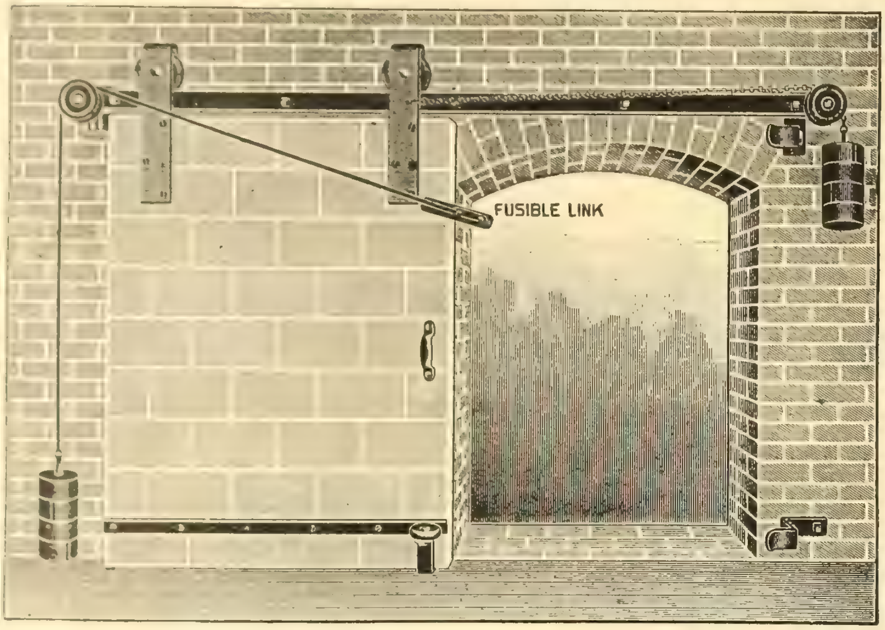
Elastica Floor Finish	Satinette "The Enamel that stays white"	Kleartone Stains	Flattine Finishes

Full Imperial Measure is used in all Packages

Made by

International Varnish Co., Limited

TORONTO WINNIPEG



Fireproof Doors and Windows

We are specialists in this particular line and can solve your most difficult problems.

Estimates furnished on complete work or any part.

Have you our Literature?

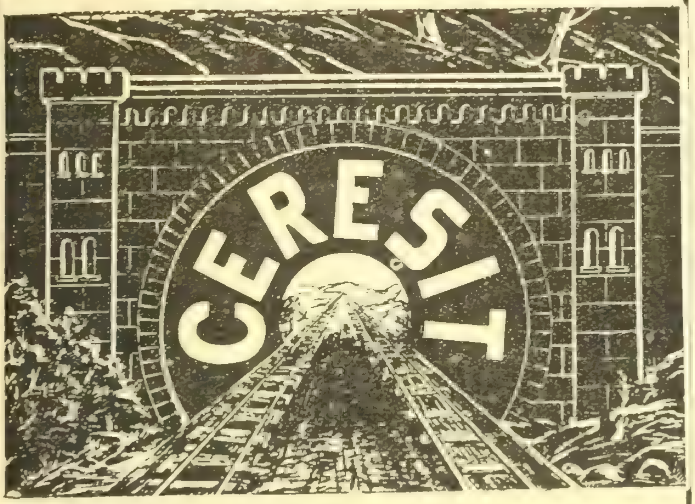
DB **DOUGLAS BROS LIMITED** DB
TORONTO, ONT. MONTREAL, P.Q.

The Hamilton Steel & Iron Co. Limited
Hamilton - Canada

Rounds, Squares,
Twisted Squares,
Maxwell
Deformed Bar

Bar Iron
Pig Iron
Forgings
R.R. Splice Bars
Tie Plates, Spikes, Axles

STEEL BARS
for Reinforcing
Concrete



No Wet Cellars No Damp Basements

Ceresit is a cream white paste readily dissoluble in water. This water is used instead of plain water for mixing Cement, Mortar or Concrete.

Cement Waterproofing Co.

115 Adams Street, Chicago

Canadian Agents

Edie Douglas, Limited
Montreal, Toronto, Ottawa

Grove-Walker, Winnipeg
Dean-Thompson, Vancouver

The Consolidated Stone Company

Quarries and Mills at Bedford, Indiana, and Bloomington, Indiana

Producers of Dark Hollow Buff and Blue
Hunter Buff and Blue Oolitic Limestone

The Celebrated

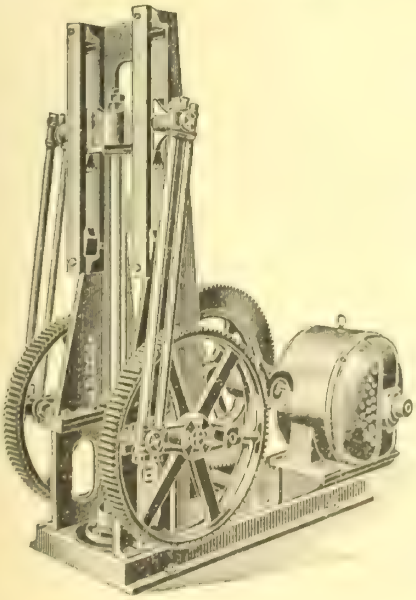
Bedford Stone

from our quarries has been used in many of the largest public buildings, churches, etc., in the United States and Canada.
Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

General Offices
324-327 Monadnock Block - Chicago, Ill.
Toronto Agent
A. P. STEWARD - Builders' Exchange

A. D. COOK,

Manufacturer of



Steam, Belt and Motor Driven
Deep Well Pumping Engines
Working Barrels and Valves
Pump Rods & Pump Rod Joints
Drill Rods and Drill Rod Joints
Drilling and Well Tools
Cook's Special Brass Tube
Well Strainer

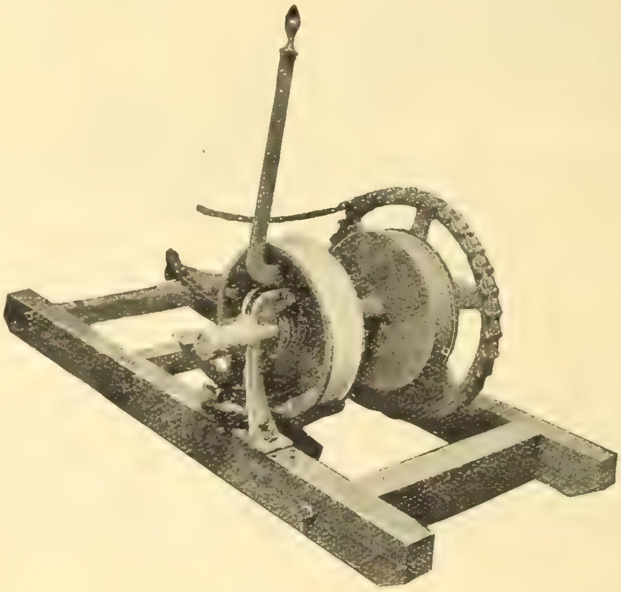
Write now
for Catalogue R.

LAWRENCEBURG, INDIANA, U.S.A.

Friction Clutch Hoist

The one with the ball bearing thrust which increases the pulling capacity about 20 per cent of the power used.

For
Contractors'
Work
Sewer
Digging
Concrete
Conveyors



For
Well
Digging
Pile
Driving
Bridge
Building

Details of the "London" Friction Clutch Hoist

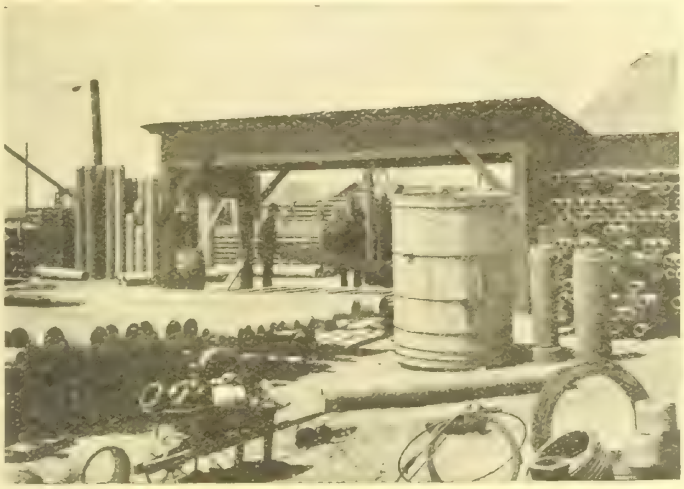
The frame-work is made of timber 4 in. by 6 in. framed and bolted together. The size of same is 32 in. by 8 ft. Any style engine may be mounted upon one end of this frame-work. Bolted to this frame-work are two heavy floor stands for carrying the steel drum shaft, on which is loosely mounted the drum. One end of the drum is made to take a **Friction Clutch** which is secured to the shaft. The clutch consists of our well-known **"London" Friction Clutch**, operated by a lever. **This clutch is so constructed that a coiled spring throws the clutch out.** By this arrangement the **hoist can be operated at a distance by a rope.** This clutch is very powerful. The dimensions of the rope drum are 19 in. over all, 4 in. diameter drum, 10 in. between the flanges, and flanges 18 in. in diameter, giving ample rope capacity. Wire rope may be used by lagging up the drum with wood strips. The brake is arranged for contact with the drum opposite the friction end. This brake is arranged with foot lever lock. We can supply a winch head of the very best design, being 5 in. by 8 in., which can be keyed to the end of the drum shaft. We supply a longer shaft when winch head is required. **The gearing consists of sprocket wheels and heavy malleable iron chain.**

This hoist is geared six to one, six teeth in sprocket on engine and thirty-six teeth in sprocket on hoist. We can furnish any ratio of gearing desired, upon application. This hoist has a capacity of 1,000 pounds at 75 feet per minute, single rope, and will handle an 800 lb. hammer for pile driving with a 5 h.p. engine.

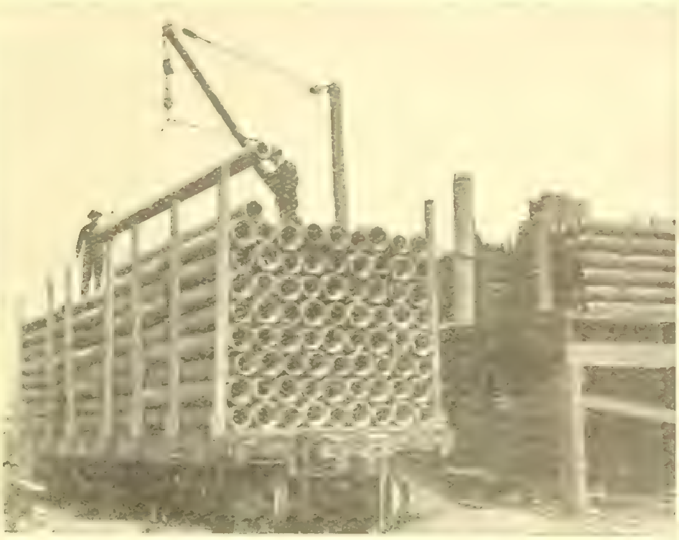
The hoist is equipped with 10 feet of chain, and any number of additional feet will be furnished at small cost. Sprocket for engine shaft furnished at market price.

The London Gas Power Co., Limited

Engineers and Machinists
LONDON, CANADA



Pipe Stock, Fittings and Reservoir Tank being assembled for Loading



Carload of Six Inch Pipe Stock about ready for Shipment

Pacific Coast Pipe Co., Ltd.

Machine Banded and Continuous

Wood Stave Water Pipe
Reservoir Tanks
for City and Rural Water Systems

FIRE PROTECTION
POWER PLANTS

Hydraulic MINING,
IRRIGATION, etc.

One Half the Cost of Iron Pipe—and Better

Estimates Furnished Write for Catalogue

OFFICE AND FACTORY:

1551 Granville Street, Vancouver

Near New High Level Bridge

P.O. Box 563.

Canadian Bank of Commerce, Parkdale, Toronto. Darling and Pearson, Architects

Canadian Bank of Commerce, College and Spadina, Toronto
Darling and Pearson, Architects

Roman Stone

(Trade Mark Registered)

Same Quality throughout

Roman Stone is especially adapted for massive architectural effects and is being used by Canada's foremost architects in their important buildings.

Roman Stone is the same throughout, no facing material is used

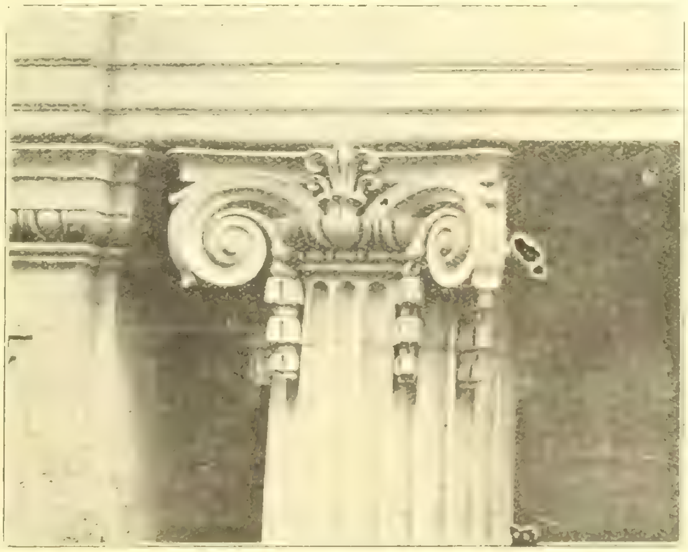
Specify Roman Stone

Canadian Bank of Commerce, Strathroy. Darling and Pearson, Architects

Roman Stone Co., Limited

Roman Stone Detail Work

Guelph Library



Roman Stone Capital

Roman Stone

is being used by the Canadian Bank of Commerce in all their buildings from coast to coast. Its adaptability for architectural and constructive uses is well exemplified by the accompanying illustrations.

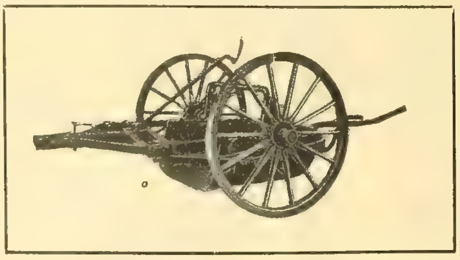
No Facing Material used in Roman Stone

Head Office: 504-505 Temple Bldg.
Weston, Ont.

T. A. Morrison & Co.
Selling Agent for Quebec
204 ST. JAMES, ST. MONTREAL

"Some Equipment With Merit"

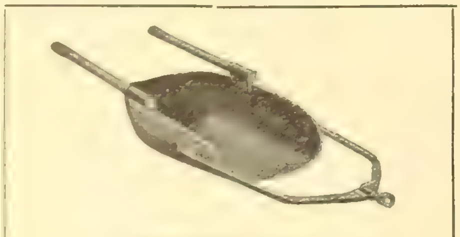
FOR THE CONTRACTOR



" Kilbourne & Jacobs " Pressed Bowl Wheelscrapers

are the very best that can be purchased anywhere. They are the only perfect wheelscraper. The best, strongest and easiest working Scraper ever put on the market.

We carry a full stock of all sizes for immediate shipment



"Columbus" Scraper

"K & J"
DRAG
SCRAPERS
In all sizes

"Boss" Scraper

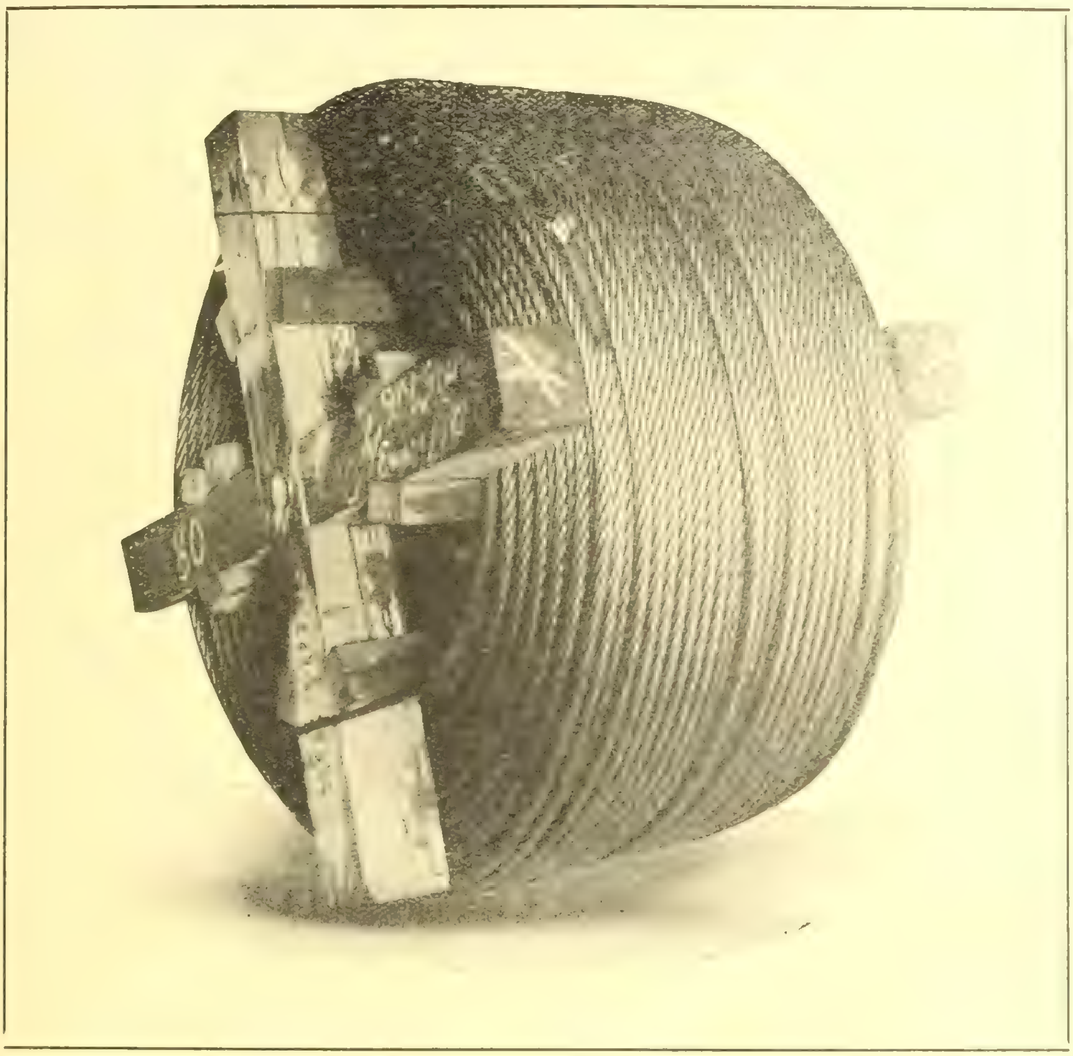
Our scrapers are the leading drag scrapers everywhere. All our scrapers are absolutely seamless throughout and are superior to any others upon the market.

We want your inquiry when in the market—Prompt shipment from stock

F. H. Hopkins & Co.

MONTREAL

Branch Offices: Winnipeg, Man. and Vancouver, B.C.



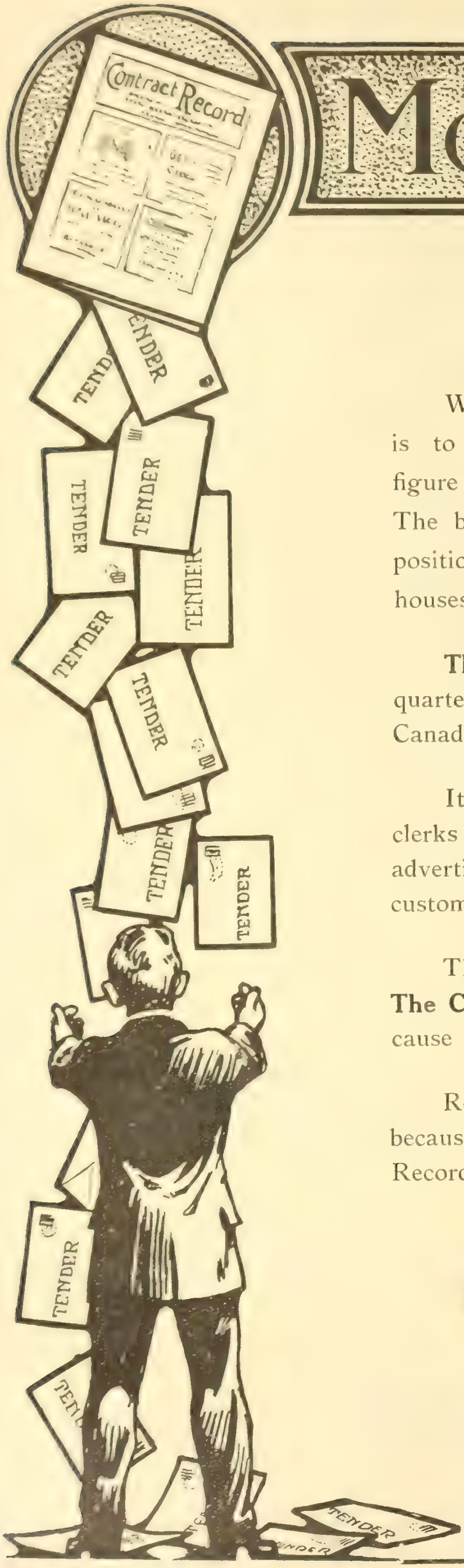
"Dominion" Wire Rope

All Lengths and Sizes in Stock

Made in Canada For Canadians By Canadians

The Dominion **WIRE ROPE** Company, Ltd.

MONTREAL



MORE BIDS &

When Tenders

When inviting tenders for any work of the main object is to have the contract executed at the lowest possible figure consistent with good workmanship and reliable materials. The best way to obtain such results is to place your proposition before a large number of contractors and supply houses.

The Contract Record has been advertising for bids for a quarter of a century and is now the recognized medium in Canada for this class of advertising.

It has become the established custom of city and town clerks and engineers, when they have a contract to let, to advertise for tenders in the **Contract Record.** Is it **your** custom to do this? If it is not, it should be.

The Dominion and Provincial Governments specify **The Contract Record** for advertising their proposed work because they know it reaches the right people.

Responsible contractors depend more and more upon it because if there is any important work proposed "The Record" knows it.

Contract

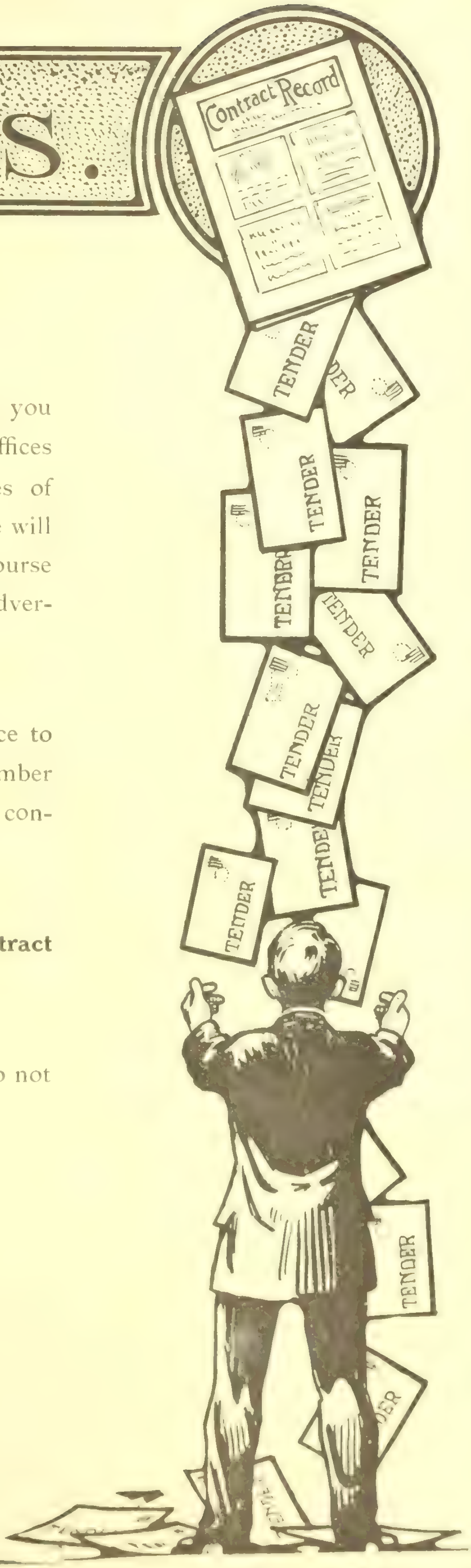
Toronto

MONTREAL
Board of Trade

TORONTO
220 King St. West

Closer Bids.

Are Wanted



In addition to putting you in touch with the firms you desire to reach, we will be pleased to place on file at our offices in Toronto, Montreal, Winnipeg and Vancouver, copies of plans and specifications of the work advertised. These will be placed at the disposal of local contractors. Of course in such cases it would be well to mention in the advertisement that plans can be seen at our offices.

In the past this service has proved a great convenience to contractors in these cities and has greatly increased the number of bids, and we trust that when **your** municipality has a contract to let, you will take advantage of our offer.

The results will prove to you the value of **The Contract Record** as a medium for proposal advertising.

Statistics prove it pays to **advertise** for tenders. Do not forget to send us your plans and specifications.

Record

Canada

WINNIPEG
Travellers Building

VANCOUVER
26 Crowe & Wilson Chambers

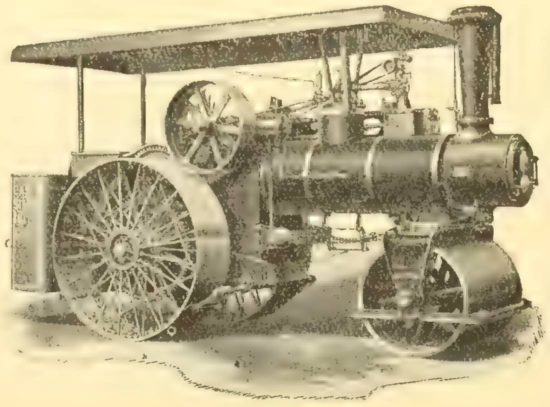
"THE ROAD IS THE THING" when built by

The CASE Power Steered Road Roller

Write for Catalog 27 on Road Roller and Road Machinery

Power Steering

Saves time over hand steering. Time saved is profit. The time saved in using a Case Roller, and the extra work accomplished, give increased profits to you, Mr. Contractor.



We Sell

Troy Dump Wagons and Dump Boxes

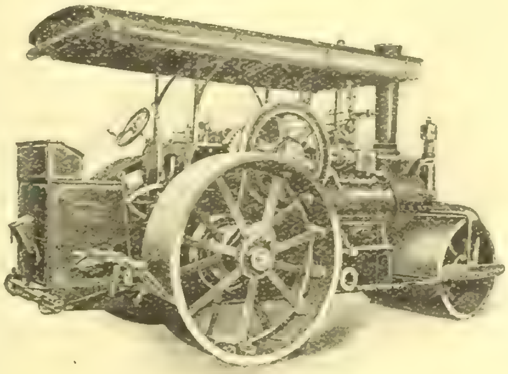
Send for our General Purpose and Municipal Tractor Catalog 26.

Price: Simple Cylinder Roller **$2200**,
(6 per cent. Discount for Cash)

J. I. Case Threshing Machine Co.
(Incorporated)
Racine, Wis., U.S.A.

The Waterous Roller

"A Canadian Roller for Canadian Roads"



Several years ago when the "Good Roads Movement" in Canada was still in its infancy, we began manufacturing the Waterous Steam Road Roller.

Since that time, as the movement has progressed and as the need of an efficient road-making machine became more imperative, we have sold over 100 of these rollers.

A careful study of competitive machines and of the special requirements of Canadian road building conditions has resulted in alterations and improvements in the original design that make the Waterous Roller what it is to-day—the Roller for Canadian roads.

To meet the demands for both light and heavy Rollers we build the Waterous Roller in three sizes, 10, 12 and 15 ton. These are kept in stock for immediate shipment. High narrow design, with centre of gravity carried low to prevent upsetting, increases the compressive power and permits turning sharp corners and working on a narrow roadway.

Special attention has been given to the design of the boiler and engine, and they are as near perfect as we can make them. The boiler (of the locomotive type) is tested to 250 pounds hydrostatic pressure, carries an exceptionally wide and deep fire-box to avoid frequent firing, and is provided with rocking grates, dumping ashpan, injectors, and ejectors of the most approved type.

Any operating engineer will appreciate the advantages of a double cylinder, double crank engine supplied on the Waterous Roller where continuous power is essential. This construction, and the fact that cranks are quarter set, eliminates all dead centres, allows the Roller to start from any position, and to be easily handled under full steam pressure when in a hole or soft spot.

The engine casting contains the double cylinders, steam chests, steam dome and cross-head guides, all finished together to be in perfect line.

Steam piping is eliminated and the position of the dome is such that the Roller can take a 30 per cent. grade head on without trouble.

Other points—the superiority of which can be seen by even a novice, are—The Double Speed Gearing, all gears cut from the solid steel, Locomotive Link Valve Motion, Special Wear Proof Rolls without Over-hang, Universal Joint Steel Yoke for front rolls, and Spring and Ratchet Rear Roll Scrapers.

Furthermore, the Roller is fitted with a full set of forged and tempered Steel Road Picks—28 for each rear roller, a driving pulley for operating rock crusher, rear draw bar and large front clevice for hauling purposes, and steel tanks to carry 500 pounds of coal and seven barrels of water.

If there is no Waterous Roller in your vicinity, write for our twenty page catalogue, No. 301, or better still, visit the Brantford Works and see the Roller being built and tested—**a practical demonstration that is its best selling argument.**

THE

Waterous Engine Works Co. Limited

Brantford, Canada

SELLING AGENTS

Hugh Cameron & Co. **72 Queen St. W., Toronto**	**Waterous Engine Works Co.** **Winnipeg, Man.**	**H. B. Gilmour** **Vancouver, B. C.**

Granitoid Pavement

(Trade Marks Registered)

The Superior of all Permanent Pavements

Fourth Street East, Calgary, Alberta.

The Blome Company Patented Granitoid Concrete Pavement

A pavement of monolithic construction that will permanently retain surface grades and satisfactorily withstand all climates, becoming more durable with age.

Granitoid pays the largest dividends in durability. The pavement is composed entirely of good concrete, made with home labor and local materials.

A city cannot make a better investment in street pavements. In adopting Granitoid, a permanent and reliable pavement is assured. The reasonable first cost, ease of repairs where cuts are made and the low cost of maintenance means a saving to your property owners.

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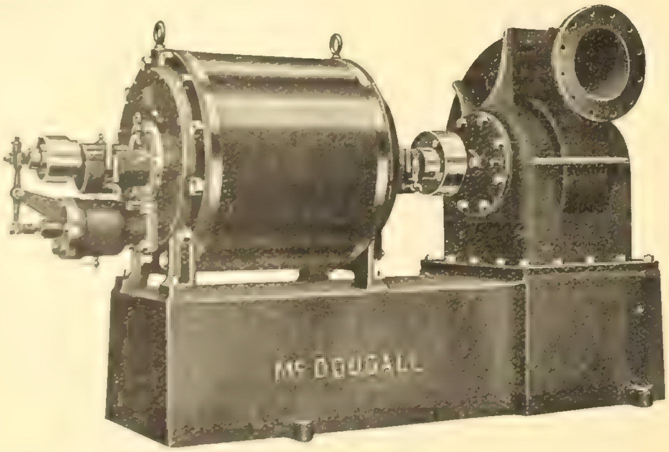

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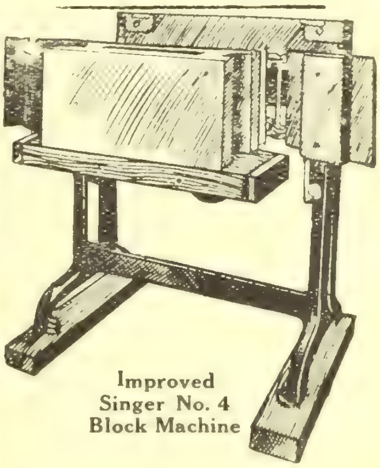
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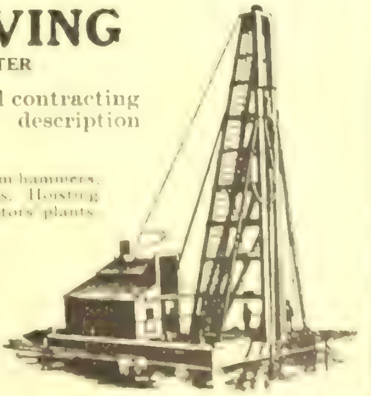

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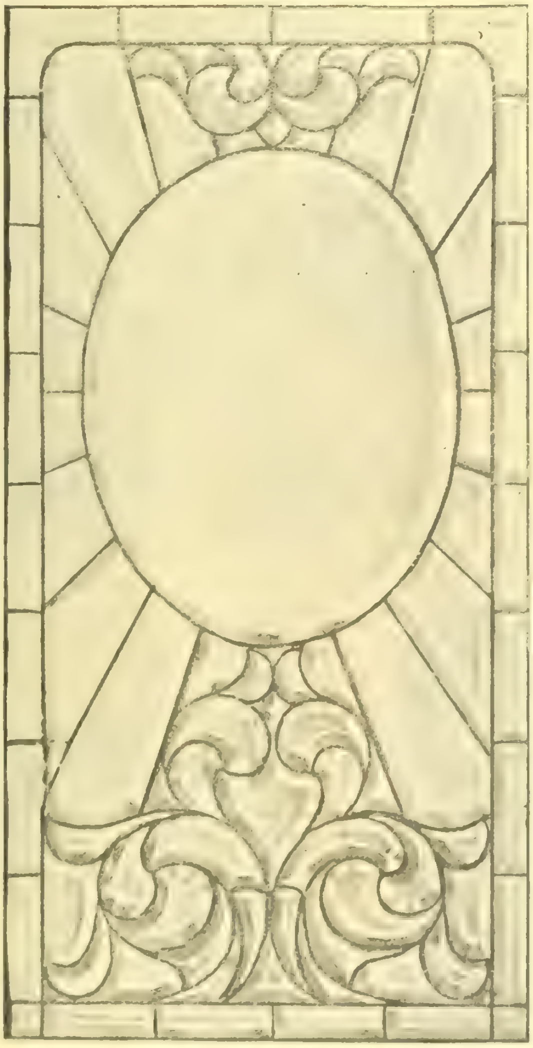

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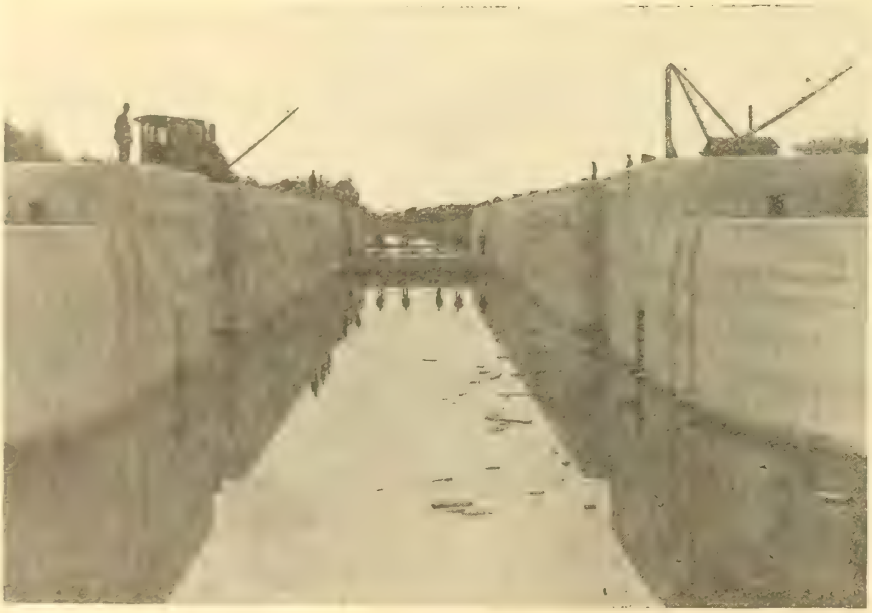
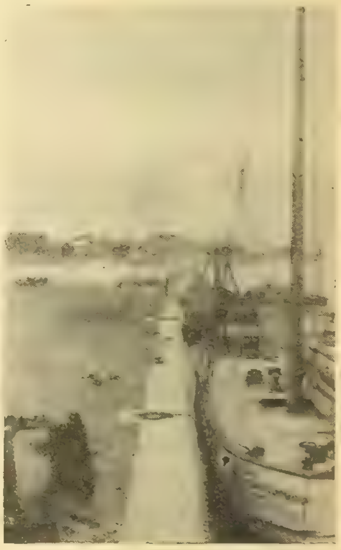
Portion Rosedale Dam, Trent Canal System

Excavating for Lock Site, Hastings Ont., Trent Canal System



Rosedale Lock, Trent Canal System



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Photographs on some different works carried on during year 1910.

Spillway and Sluice on Dam constructed for [illegible] Power Co.

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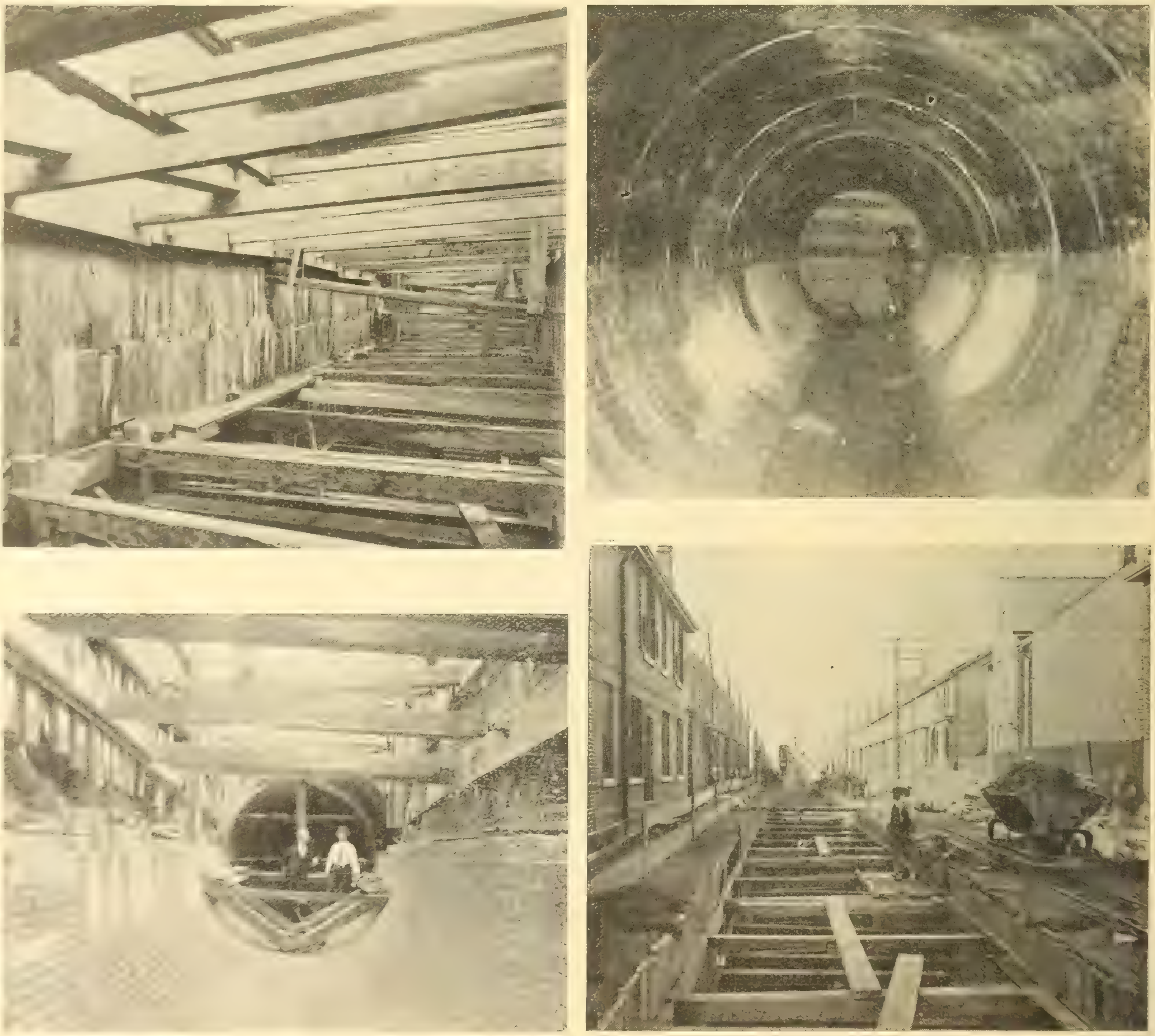

Views taken in course of Construction of the High Level Intercepting Sewer, Toronto

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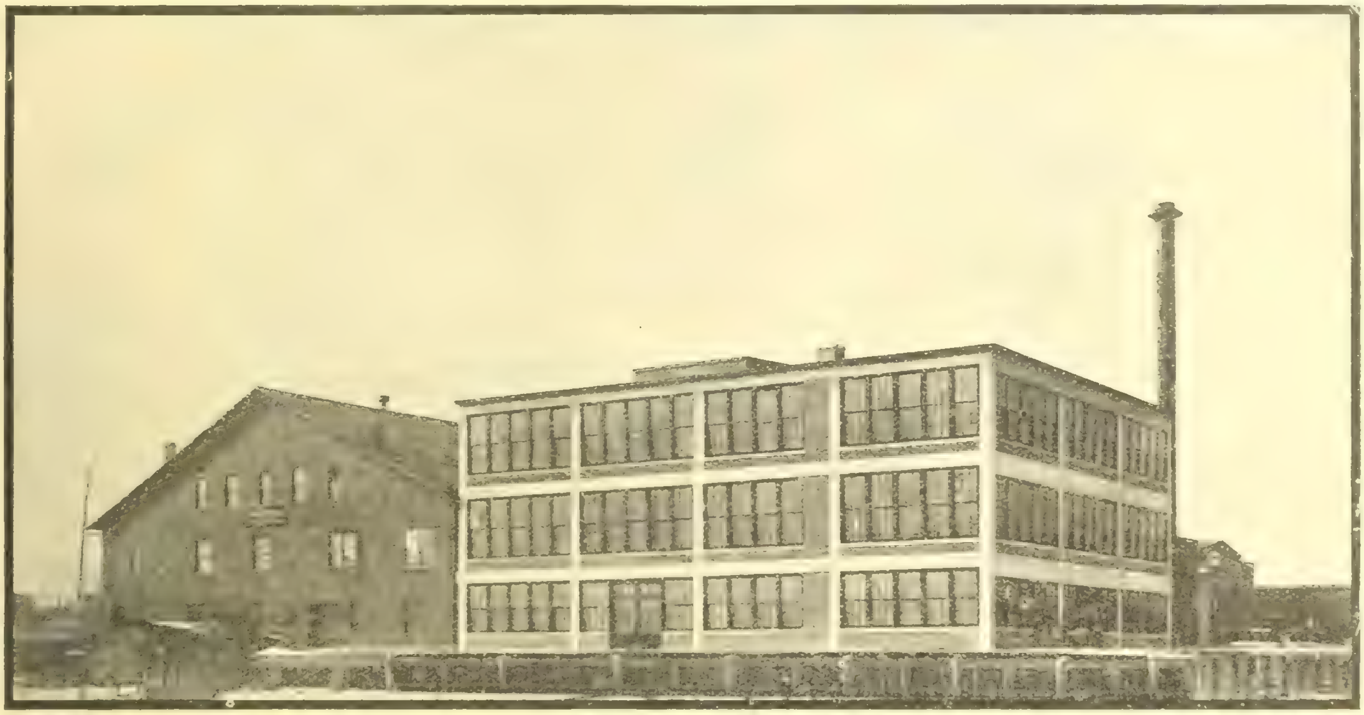

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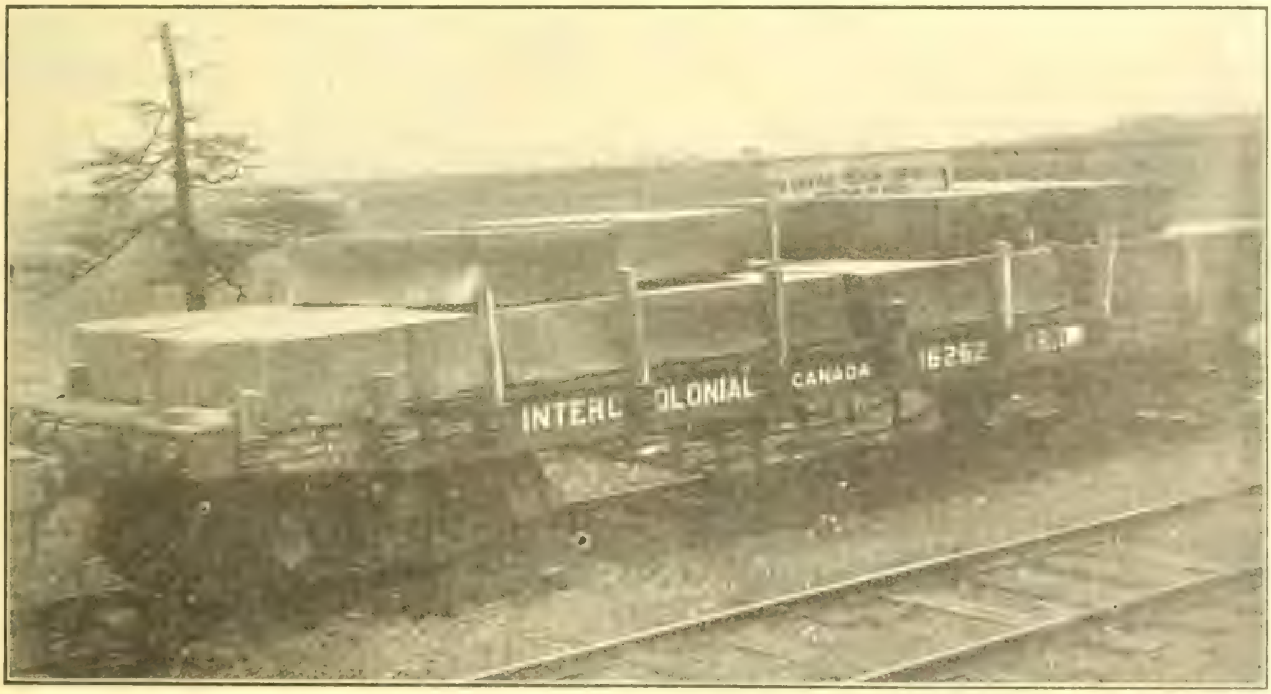

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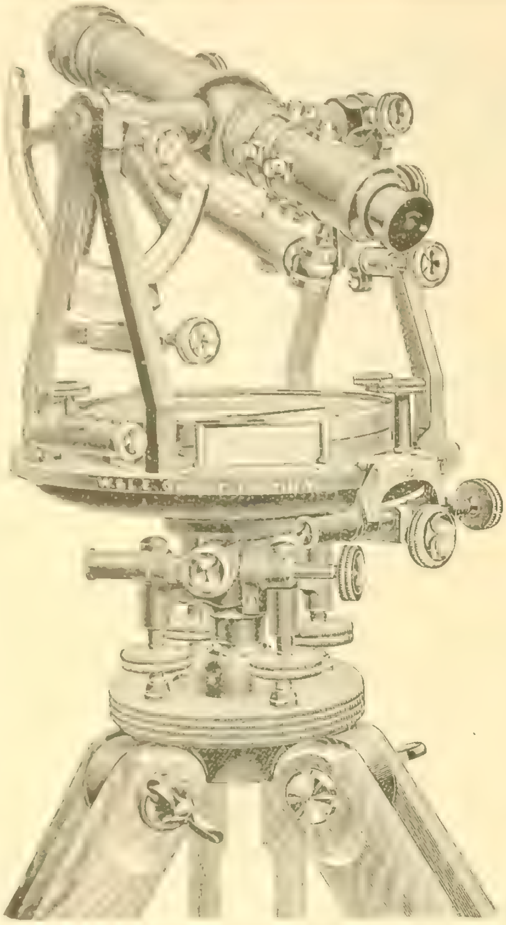

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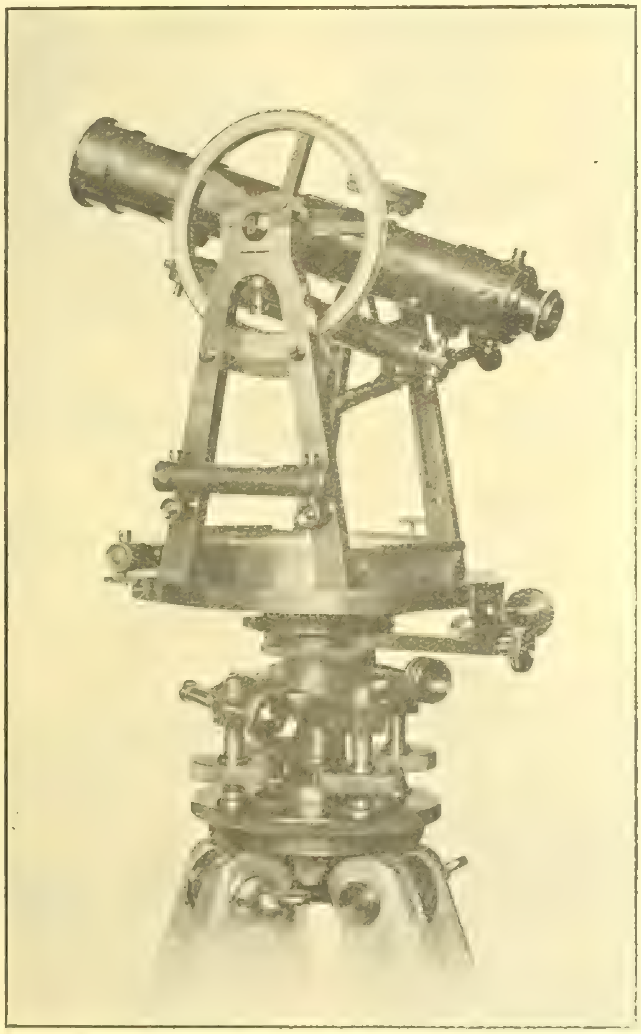

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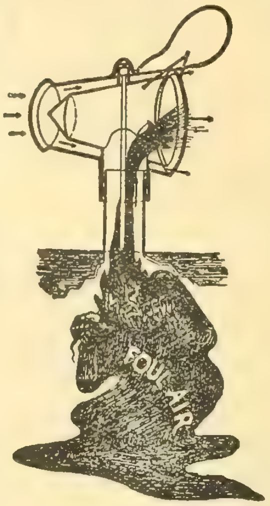

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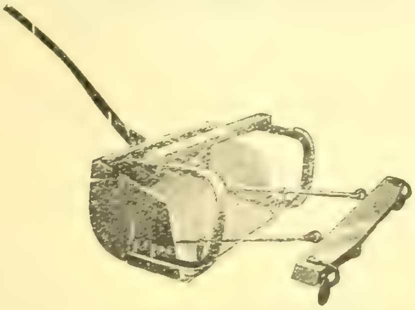

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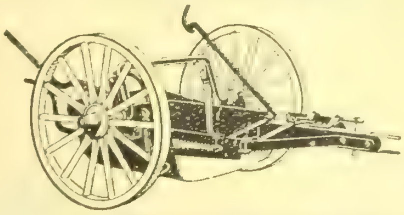

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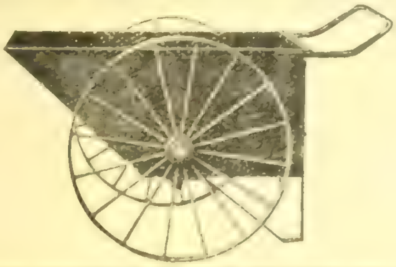

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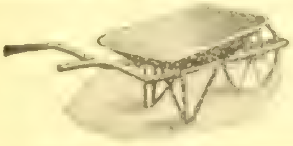

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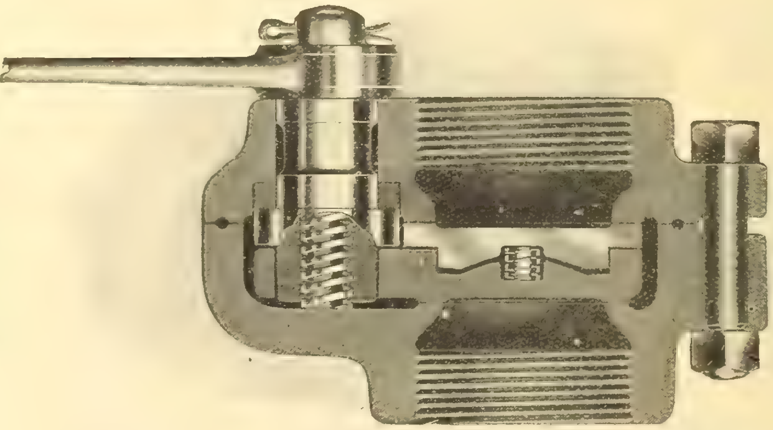
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Belting

Unequalled for Industrial Plants, Power Plants, Quarries Brick Yards Etc.

Samples and prices on application to

Dominion Belting Co., Ltd.

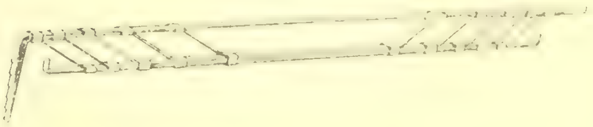
HAMILTON, - ONT.

Save from 25% to 50% of Steel

by using the

"Burrowes" Patented System of Reinforcement for Concrete

A perfect reinforcement for beams, girders, slabs, arches, retaining walls, culverts, circular conduits, concrete poles for power and telegraph lines, and every kind of concrete construction.



We will supply reinforcement fabricated, or will lease or sell rights.

For further information apply to

Sidney Burrowes, Niagara Falls Centre, Ontario

Canadian Patent No. [illegible] Patented in Great Britain and U.S.A.

Robert W. Hunt & Co. Engineers

Bureau of Inspection Tests and Consultation

Dominion Bureau, Canadian Express Building, MONTREAL

Inspection and Tests of Steel, Iron and Cement
Resident Inspectors through Canada

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"THEY NEVER FADE"

COLORS Red Purple Buff Black Brown

for Cement, Mortar, Bricks, Stone, Concrete Etc

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Steel Plate and Structural Work

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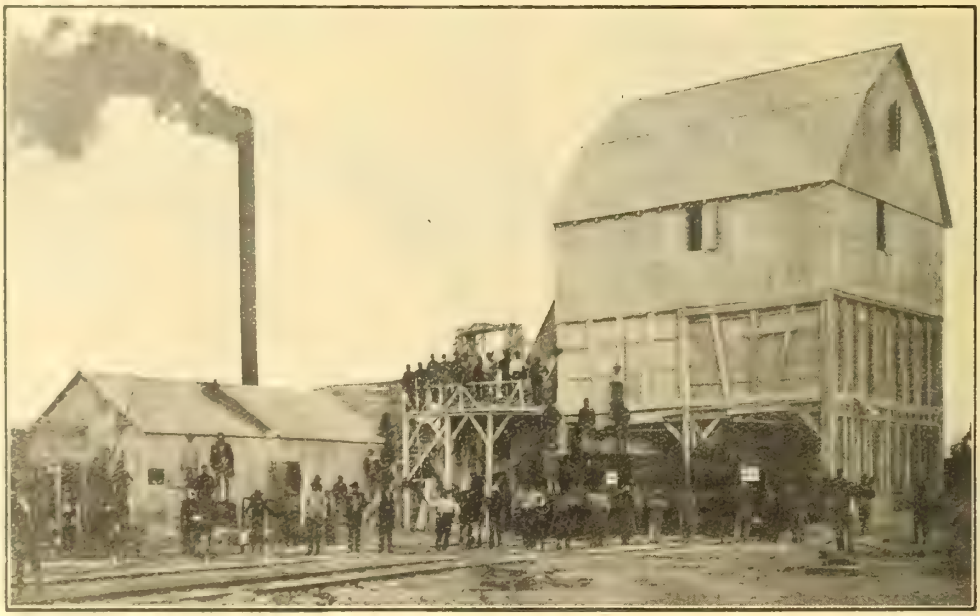
Hagersville Contracting Co., Limited

Crushed Stone

For Concrete and Macadam

THE TOUGHEST STONE FOR MACADAM IN ONTARIO



Crushing Plant at Our Quarries

Capacity increased from 400 tons per day last season to 1,000 tons per day for 1911

Why use a cheap stone that would last one or two years when an indestructible stone would cost but a few cents per ton more.

Is That Cood Business?

Office and Quarries: Hagersville, Ontario

Sales Agents for Toronto:

Sand and Supplies Limited, Foot of Spadina Ave.

Stone delivered on G. T. R., M. C. R., C. P. R. and T. H. & B. Railways

J. C. Ingles, Manager, Hagersville, Ontario.

Sand and Gravel

Lime
Cement
Plaster
Hair

Fire Clay
Fire Brick
Sewer Pipe
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Our prices are right and our service good.

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Builders and Contractors

All kinds of Masonary Work

151 Rusholme Road - TORONTO
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Asbestos-Cement Shingles

"The Roof That Outlives the Building"

It's the easiest thing in the world to interest a client in a roofing that needs no repairing or painting—especially if he has had experience with an old time roofing.

The bare fact that Asbestos Cement Shingles are made of reinforced concrete is a convincing argument in itself. There's no getting away from the permanence of reinforced concrete—the tests it has stood in every climate, the disastrous fires and the centuries of time.

Asbestos-Cement Shingles are weatherproof — fireproof — timeproof. Cannot rot, rust, crack, split or blister. They literally outlive the building—without repairs.

You will find proof of the durability of Asbestos-Cement Shingles all over America and Europe on thousands of buildings of all types—residences, public buildings and industrial plants.

You can get Asbestos-Cement Shingles in shapes and sizes to fit any architectural scheme. Three colors, Newport Gray (silver gray), Slate (blue black) and Indian Red. Ask your roofer for new quotations.

Asbestos Manufacturing Co., Ltd.

705 Eastern Townships Bank Building, MONTREAL, P.Q.
Factory at Lachine, P.Q.

Write for Booklet C. R.

We are Headquarters for Air Cell Pipe Covering, Asbestos Paper. Millboard etc. in fact we make everything in the Asbestos line Compare our prices with what you are paying our competitors.

TENDERS

For Roofing and Sheet Metal Work

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A. Schwoerer & Sons, Inc.
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Now working in Winnipeg, Regina, Vancouver Montreal and Ottawa

SHAWMUT VITRIFIED PAVING BRICK WORKS

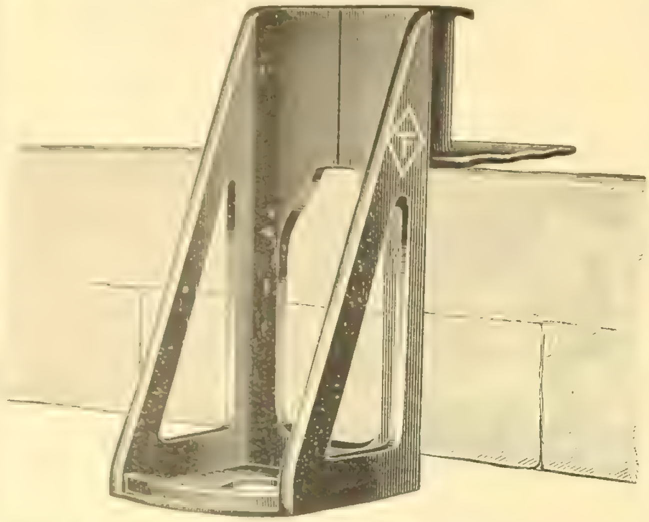
SHAWMUT, PA. ALFRED YATES, GEN. MGR.

Vitrified Shale and Fire Clay
Paving Bricks and Blocks

Burned in Yates' Patent Kiln

Samples and Prices on Application

Builders' Joist Hangers
ALL SIZES AND STYLES



Wall Hangers, Post Caps and Bases

If you will use these Hangers and Caps you will save money, time, labor and timber. If you have not got a catalog we will send one on request.

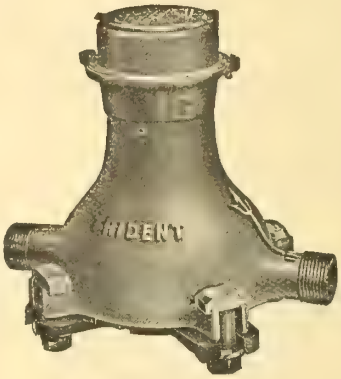
We are the only MANUFACTURERS in CANADA of THIS LINE

Estimates Furnished

TAYLOR-FORBES COMPANY, Limited
GUELPH, ONTARIO

Neptune Meter Co.

Manufacturers of the well-known



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Frost-Proof
Water
Meters

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Main Office - 90 West Street
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of any American, Canadian, or Foreign Technical or Trade Journal furnished on short notice at moderate rates; also Newspapers and Magazines, Government and State Reports of all kinds in stock. Proceedings and Transactions of Societies, Associations, etc., (volumes, odd numbers or sets) supplied. Sets and runs of periodicals made up. Information concerning any publication published in any part of the world furnished free of charge. Clippings on special subjects furnished promptly, also bibliographies on any subject. Special attention given to Library orders.

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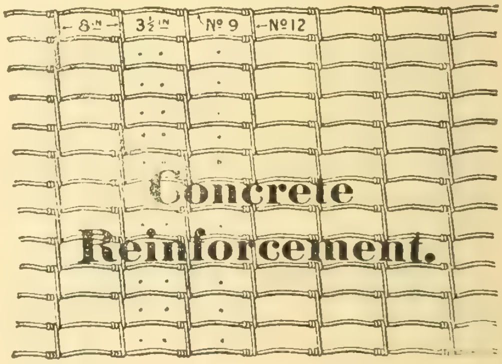
of all kinds bought.

Special subscription price list on request.

A. W. Castellanos, 263 Armstrong Ave.
Jersey City, N. J.

Concrete Reinforcement
In 3½ ft. Rolled Units

Page Concrete Reinforcement with a 3½ x 8 mesh, and running wires of 2,200 lb. tensile strength is used on the Harbour Commission Elevator, Montreal, Soulanges Canal, etc. It replaced on the Chambly Dam reconstruction on the Richelieu, a reinforcing that failed, although of large reputaton. This is proof of its quality. It really reinforces concrete work under heavy stresses.



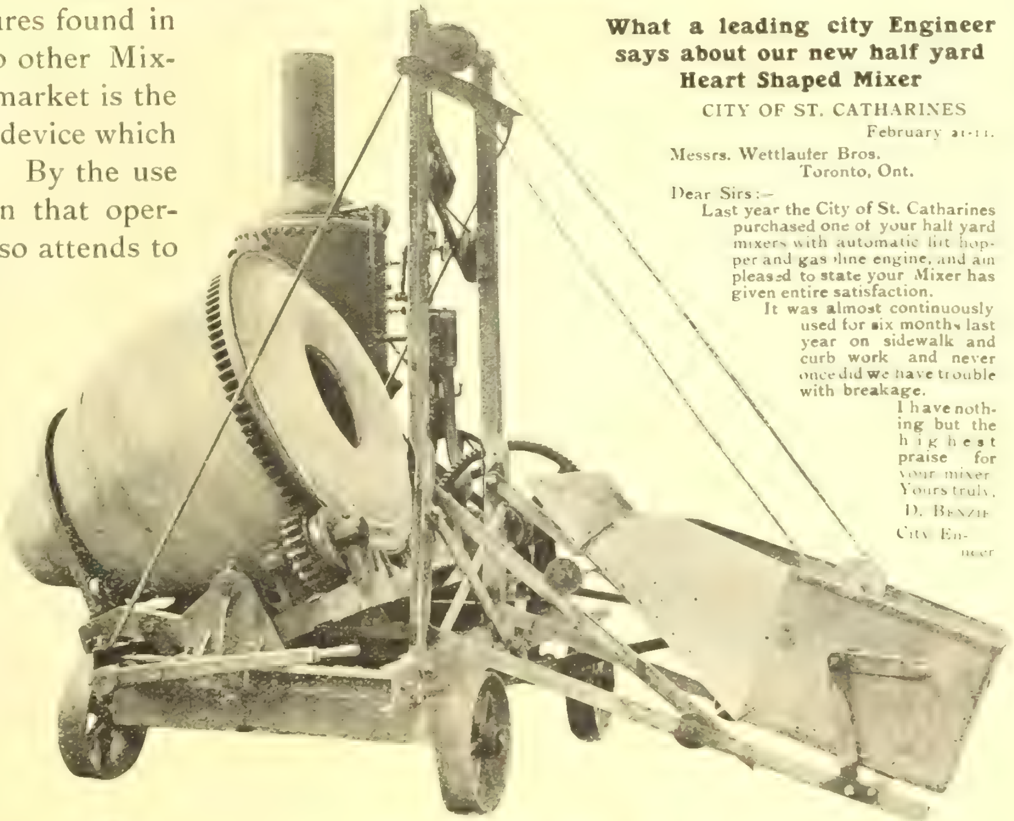
Put up in rolls for easy transportation. Running wires of high carbon steel, not bent or kinked, and of full strength. For adaptable and safe reinforcing of concrete, in dam, retaining wall, and bridge work, factory and foundation work, etc.

PARTICULARS, QUOTATIONS AND SAMPLE ON REQUEST.

Page Wire Fence Company, Limited
Walkerville, Ont.
Toronto Montreal St. John

Every Contractor who Investigates is bound to give first place to the New Wettlaufer Improved Heart Shaped Mixers.

Among the new features found in our Mixers, and in no other Mixers on the Canadian market is the Automatic Dumping device which discharges the drum. By the use of this device the man that operates the lift hopper also attends to the discharging of the drum at the back of the machine. This means you need no man at the front of the Mixer. These machines therefore can be operated with one man less than any other Mixer on the market.



What a leading city Engineer says about our new half yard Heart Shaped Mixer

CITY OF ST. CATHARINES

February 21-11.

Messrs. Wettlaufer Bros.
Toronto, Ont.

Dear Sirs:—

Last year the City of St. Catharines purchased one of your half yard mixers with automatic lift hopper and gasoline engine, and am pleased to state your Mixer has given entire satisfaction.

It was almost continuously used for six months last year on sidewalk and curb work and never once did we have trouble with breakage.

I have nothing but the highest praise for your mixer.

Yours truly,
D. BENZIE
City Engineer

New half yard Heart Shaped Mixer

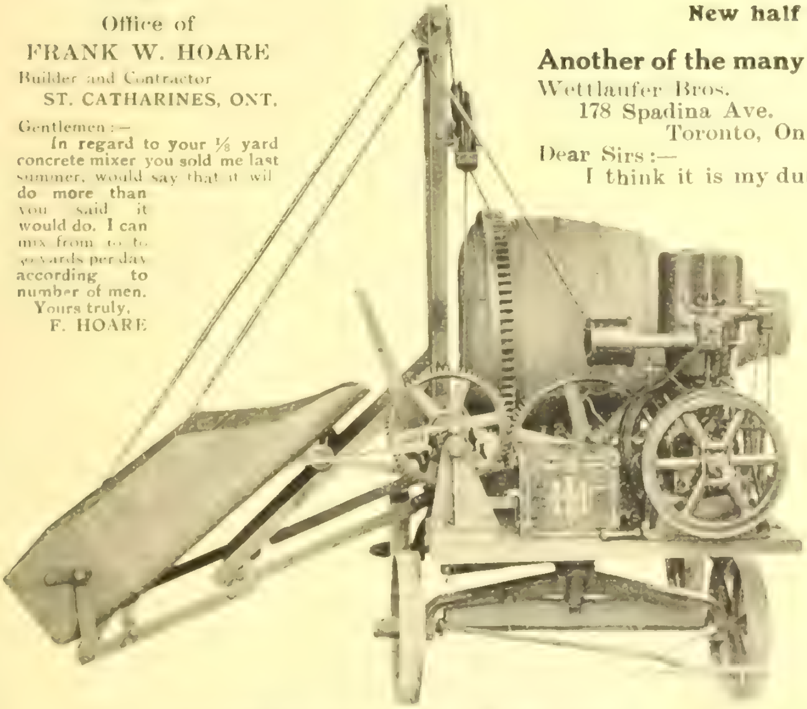
An 1/8 yard Mixer that is "Making Good"

Office of
FRANK W. HOARE
Builder and Contractor
ST. CATHARINES, ONT.

Gentlemen:—

In regard to your 1/8 yard concrete mixer you sold me last summer, would say that it will do more than you said it would do. I can mix from [illegible] to [illegible] yards per day according to number of men.

Yours truly,
F. HOARE



Another of the many fine recommendations we can show you

Wettlaufer Bros.
178 Spadina Ave.
Toronto, Ont.

J. O. GIROUX
C. N. Railway Contractor
BELLVILLE,—Feb. 14-11.

Dear Sirs:—

I think it is my duty to inform you that I am entirely satisfied with the two cement mixers purchased from you last season. I have tested them in every way possible and in every case I have found them capable of doing first class work.

Yours sincerely,
J. O. GIROUX

Save their Cost in 6 Months

Contractors who use the new Wettlaufer heart shaped Mixers save the cost of a Mixer in the course of six months by the saving of an extra man's salary.

The popularity of our new Mixers is shown by the fact that during the past month our sales have doubled any previous month's record since we started business. Since starting we have sold 100 mixers in the city of Toronto alone. See names of purchasers in Catalogue

We also manufacture a complete line of

BLOCK MACHINES, BRICK MACHINES, SEWER MOULDS, SILO MOULDS, ETC.

New eighth yard Heart Shaped Mixer

Send for new Catalogue

Wettlaufer Bros.

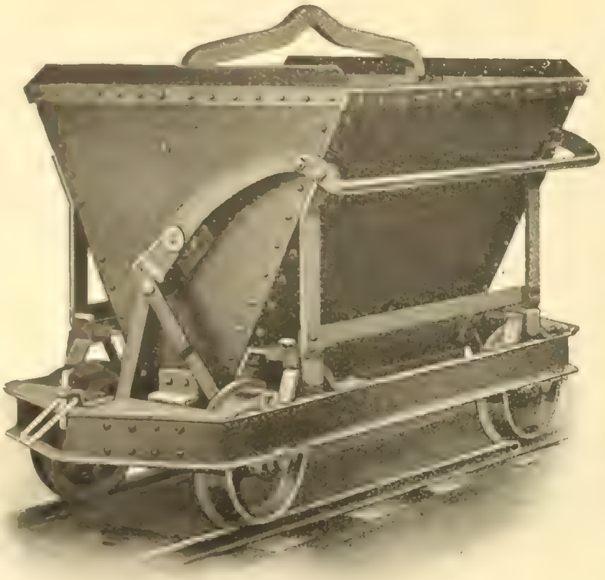
**178 SPADINA AVE.
TORONTO**

**A. R. WILLIAMS MACHINERY CO.
15 Dock Street, ST. JOHN, N. B.**

**W. E. Ransome
MOOSE JAW, SASK.**

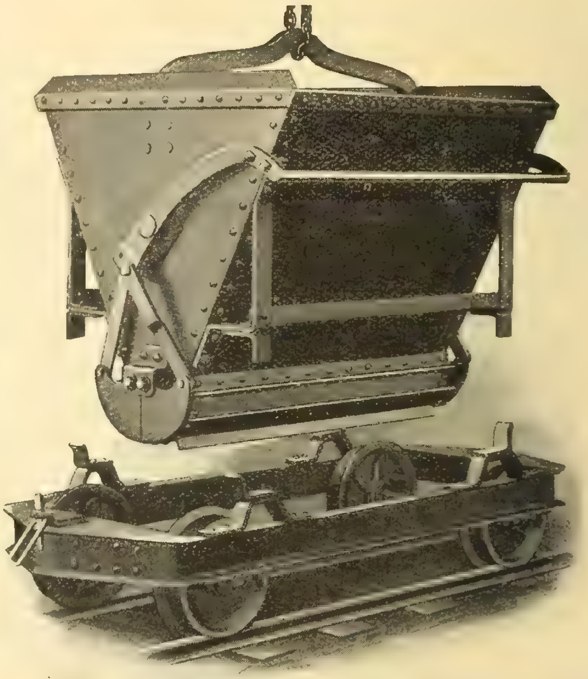
Douds Combination Bucket and Car

(Center Dump and Controllable.)



(PATENTS PENDING)

View shows Bucket resting on Trucks



View shows Bucket being lifted from Trucks

It's designed right. It's built right. It works right. It always gives satisfaction. Use it as a Bucket or Center Dump Car. Load under absolute Control. No lifting of trucks when used as a bucket. Simple and durable.

December 13, 1910.

The Acme Equipment & Engineering Company,
1032 Garfield Bldg., City.

Gentlemen,—Several months ago we purchased one of your Combination Bucket & Cars, of one yard capacity, and we have used same upon Belt Line construction work on W. 25th street, this city.

We empty the concrete direct from mixer into car, then haul same up the incline to desired point of discharge, this is accomplished by hoisting engine located near mixer.

We have learned that the discharge of concrete can be controlled perfectly, both as to width of opening in bottom of car, and as to the amount discharged at one time, as discharge can be cut off at any time.

Owing to the fact that body of car is made separately from the trucks, it can be handled by derrick, crane or cable-way, which is a great advantage in construction work.

The car is well constructed, and more than fulfills our expectations, and we take pleasure in recommending same.

Yours very truly,
(Signed) THE WM. KUPPER CONSTRUCTION CO.
Per Wm. Kupper, President.

If you are interested in

STREET PAVING WORK

Write us about our new

Concrete Paving Cart

If you want up-to-date equipment
for handling your concrete, write—

The Acme Equipment & Engineering Co.

Garfield Bldg., Cleveland, Ohio, U.S.A.

The Dominion Equipment & Supply Co., Winnipeg, Canada

Doud's Acme Center Dump Bucket

The Bucket

for handling material rapidly.

The symmetrical movement of the doors deposits the load perfectly central

No side jumping or side splashing.

22 sold to one contractor.

No slides, no springs, no complicated parts to get out of order.

Note simplicity of construction.

THE FOUNDATION COMPANY
115 Broadway,
Western Office New York, N.Y. Cable Address
Chicago, Ill. "Underfound"

The Acme Equipment & Engineering Co.,
Cleveland, Ohio.

Gentlemen.

In answer to your inquiry of recent date, regarding the Doud Acme Center Dump Bucket, will say, that I have used your buckets during the entire life of this contract, now going on over one year; in that time I have placed 55,000 cubic yards of concrete, and my Master Mechanic reports that one slight repair only, has been made in that time.

Your bucket in every way has given perfect satisfaction, and is all the word "Acme" implies, and in my eighteen years' experience I have used no better.

Yours very truly,
(Signed) W. S. Downing,
Superintendent The Municipal Building,
City of New York.

Original of this and many other similar letters on file in our office.

Doud's "Controllable" Center Dump Bucket

An Absolutely Controllable Discharge Bucket

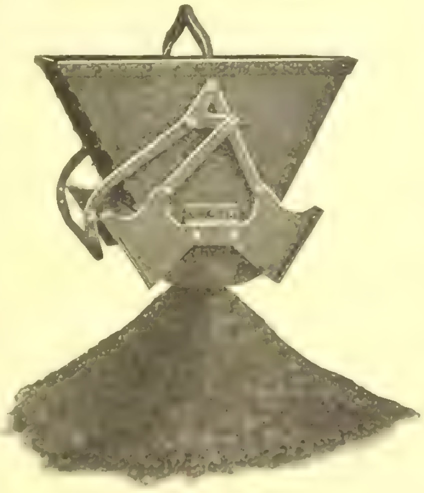
One man can open and close this bucket under load with very little effort.

It discharges perfectly central.

It is groutproof when closed and self supporting.

The most powerful leverage of any Controllable Discharge Bucket.

Maximum bottom opening 16 inches.


Patented

F. C. Jackson. E. C. Goldie.
JACKSON & GOLDIE
Railroad and Bridge Contractors,
St. Boniface, Man., Nov. 21, 1910.

Dominion Equipment & Supply Company,
Winnipeg, Man.

Dear Sirs,—We have used on our work this summer two Doud's Controllable Discharge Buckets supplied by you, and have found them satisfactory in every way.

We consider them a great saving for placing concrete in narrow wing walls and ballast walls. We have placed concrete in forms 18 inches wide, and have found no more difficulty in doing so than in wider forms.

We have had several inquiries from other contractors in this vicinity regarding the output. The lost time in dumping and placing compares very favorably with the regular style of self dumping buckets.

Our maximum output for one day with one bucket, fed from a one-half yard mixer, has been 120 cubic yards in nine hours.

Yours truly,
(Signed) JACKSON & GOLDIE,
Per E. C. Goldie

The Acme Equipment & Engineeing Company

Cleveland, Ohio, U.S.A.

The Dominion Equipment and Supply Co., Winnipeg, Canada

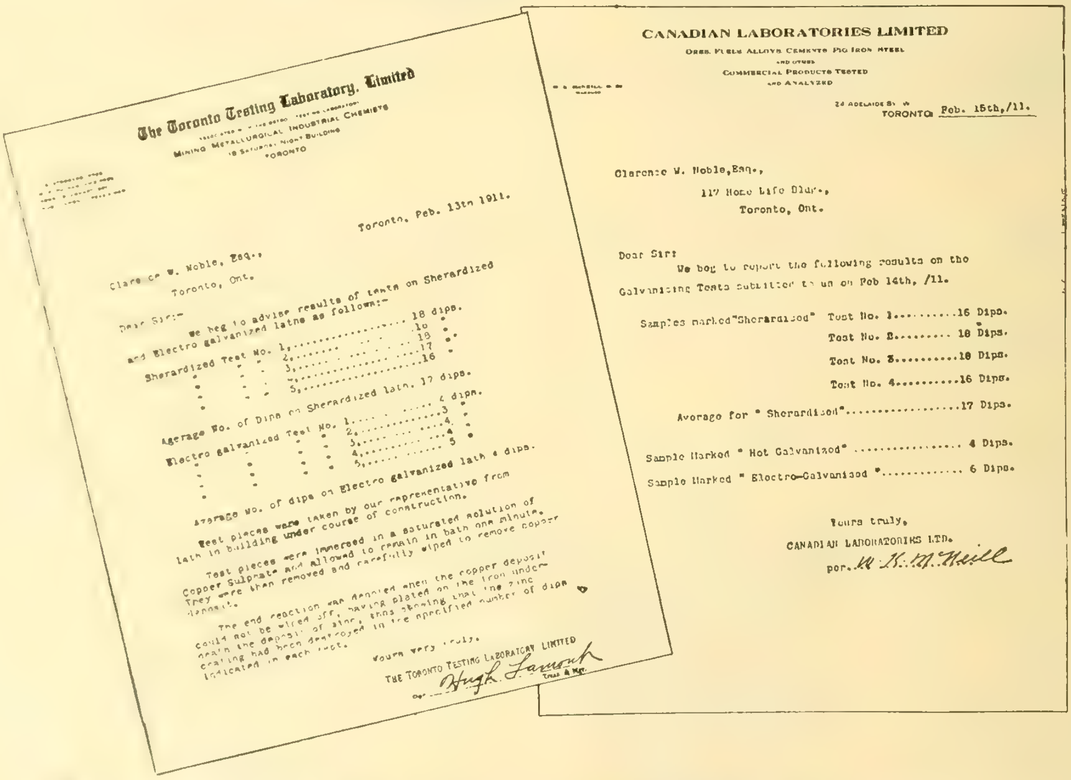
Sherardized Herringbone Lath

is now on the market. Just look at these galvanizing tests. They are by Prof. C. F. Burgess, of the chair of Metallurgy, University of Wisconsin. He dissolved equal quantities of various coatings in diluted sulphuric acid. Here are the the times they took to dissolve:

THE LINES TELL THE STORY

Sherardizing coating - -	304 minutes
C. P. Zinc - - -	114 minutes
Electro galvanized coating -	50 minutes
Hot process dross, C. C. & G. Mfg. Co.	79 minutes
Hot process bath, C. C. & G. Mfg. Co.	20 minutes
Hot process coating from B— hardware	21 minutes

The Testing of Experts



The Toronto Testing Laboratory, Limited
Mining Metallurgical Industrial Chemists
18 Saturday Night Building
Toronto

Toronto, Feb. 13th 1911.

Clarence W. Noble, Esq.,
Toronto, Ont.

Dear Sir:-

We beg to advise results of tests on Sherardized and Electro galvanized laths as follows:-

Sherardized Test No. 1,.................. 18 dips.
" " " 2,.................. 16 "
" " " 3,.................. 18 "
" " " 4,.................. 17 "
" " " 5,.................. 16 "

Average No. of Dips on Sherardized lath, 17 dips.

Electro galvanized Test No. 1,............ 4 dips.
" " " " 2,............ 3 "
" " " " 3,............ 4 "
" " " " 4,............ 4 "
" " " " 5,............ 5 "

Average No. of dips on Electro galvanized lath 4 dips.

Test pieces were taken by our representative from lath in building under course of construction.

Test pieces were immersed in a saturated solution of Copper Sulphate and allowed to remain in bath one minute. They were then removed and carefully wiped to remove copper deposit.

The end reaction was denoted when the copper deposit could not be wiped off, having plated on the iron underneath the deposit of zinc, thus showing that the zinc coating had been destroyed in the specified number of dips indicated in each test.

Yours very truly,
THE TORONTO TESTING LABORATORY LIMITED
per Hugh Lamont Treas & Mgr.

CANADIAN LABORATORIES LIMITED
Ores Fuels Alloys Cements Pig Iron Steel
and other
Commercial Products Tested
and Analyzed

24 Adelaide St. W.
TORONTO Feb. 15th,/11.

Clarence W. Noble, Esq.,
117 Home Life Bldg.,
Toronto, Ont.

Dear Sir:
We beg to report the following results on the Galvanizing Tests submitted to us on Feb 14th, /11.

Samples marked "Sherardized" Test No. 1..........16 Dips.
Test No. 2.......... 18 Dips.
Test No. 3..........18 Dips.
Test No. 4..........16 Dips.

Average for "Sherardized"..................17 Dips.

Sample Marked " Hot Galvanized" .... 4 Dips.
Sample Marked " Electro-Galvanized "............ 6 Dips.

Yours truly,
CANADIAN LABORATORIES LTD.
per W. K. McNeill

Emphasizes the Overwhelming Superiority of Herringbone Sherardized Lath.

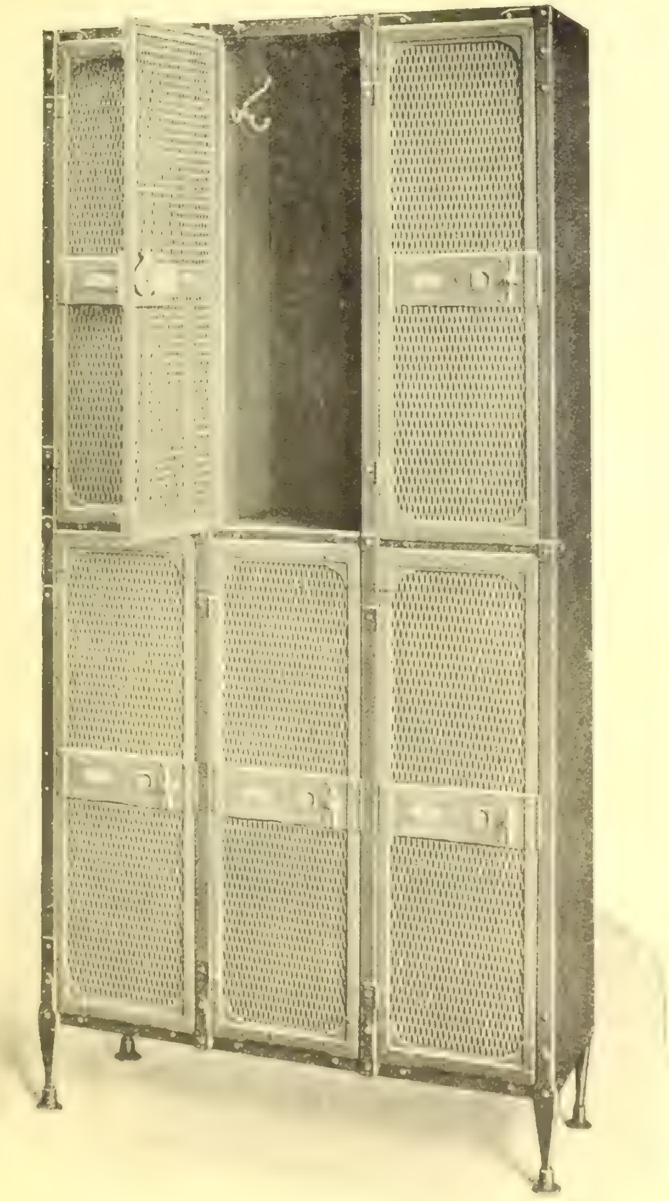
Our right to the Sherardizing process for metal lath is exclusive. If you want the best protection and the best lath — HERRINGBONE OF COURSE.

Clarence W. Noble, - General Sales Agent

117 Home Life Building, Toronto

The Metal Shingle Siding Co., Manufacturers

Metal Wardrobe Lockers



are a necessary feature in the equipment of modern business buildings and public institutions.

D-L

Standard Steel Lockers

minimize danger from fire, prevent petty theft, economise space and save time, money and contents.

They are sanitary and cleanly and promote order, tidiness and system.

D-L Lockers are the Lockers of quality—made from dead flat, patent levelled, special steel sheets. They have many points of superiority over ordinary wire and expanded metal lockers.

Modern labor saving devices and a special department devoted exclusively to lockers enables us to make a superior article at very reasonable cost.

Booklet D gives full particulars. It's yours for a post card

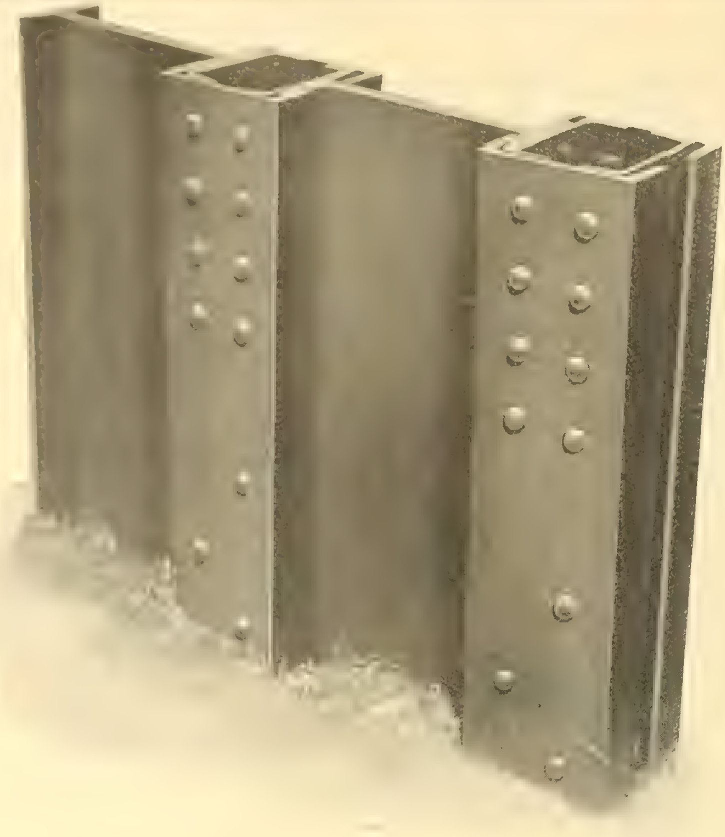
Dennis Wire and Iron Works Co.

Limited

Locker Department

London, Ontario

Toronto: Corner Front and Water Streets



HUNTER PATENT STEEL PILING

To be used in Hamilton Docks by Domininion Government

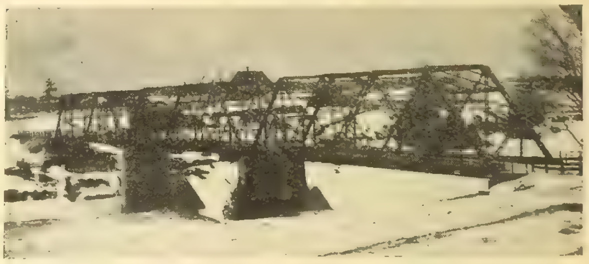
For Bridges and Building Caissons, Cofferdams, Dams, Irrigation and Reclamation Work, Retaining Walls, Sewer and Trench Work, Mining Shafts, Foundations.

Especially adaptable for permanent and temporary deep and heavy work not successfully accomplished by other types of piling, such as Deep Water Cribs, Docks and Dry Docks, Breakwaters, Wharves, Sea Walls, Locks, Light houses and Submarine Work. This piling can be made for all classes of work, can use all Standard Rolled Beams and Channels thus giving a piling that will fill the bill for any work above specified. It drives freely, keeps in alignment, water tight and great strength.

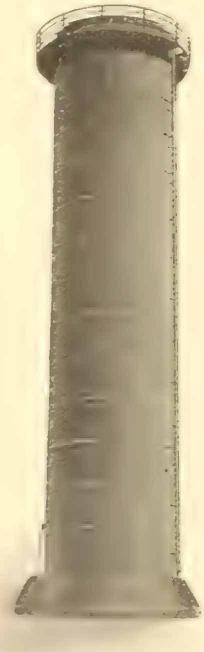
"I congratulate the county council in general and the road and bridge committee in particular on the satisfactory contract you have recently completed. I consider that a more substantial, well designed, well built, up-to-date structure for its magnificent size cannot be found in Ontario to-day."

R. McDOWELL, C.E.,
(Owen Sound) Engineer in Charge.

We manufacture Steel Bridges of all kinds, the above cut shows our work and this is what the engineer in charge has to say about it.



396 ft. Bridge over Sanguine River near Southampton



Send us your specifications for your Stand Pipes, Water Tanks for we make a specialty of this class of work. Have had many years experience and can furnish you with references if necessary as to the standard of our work.

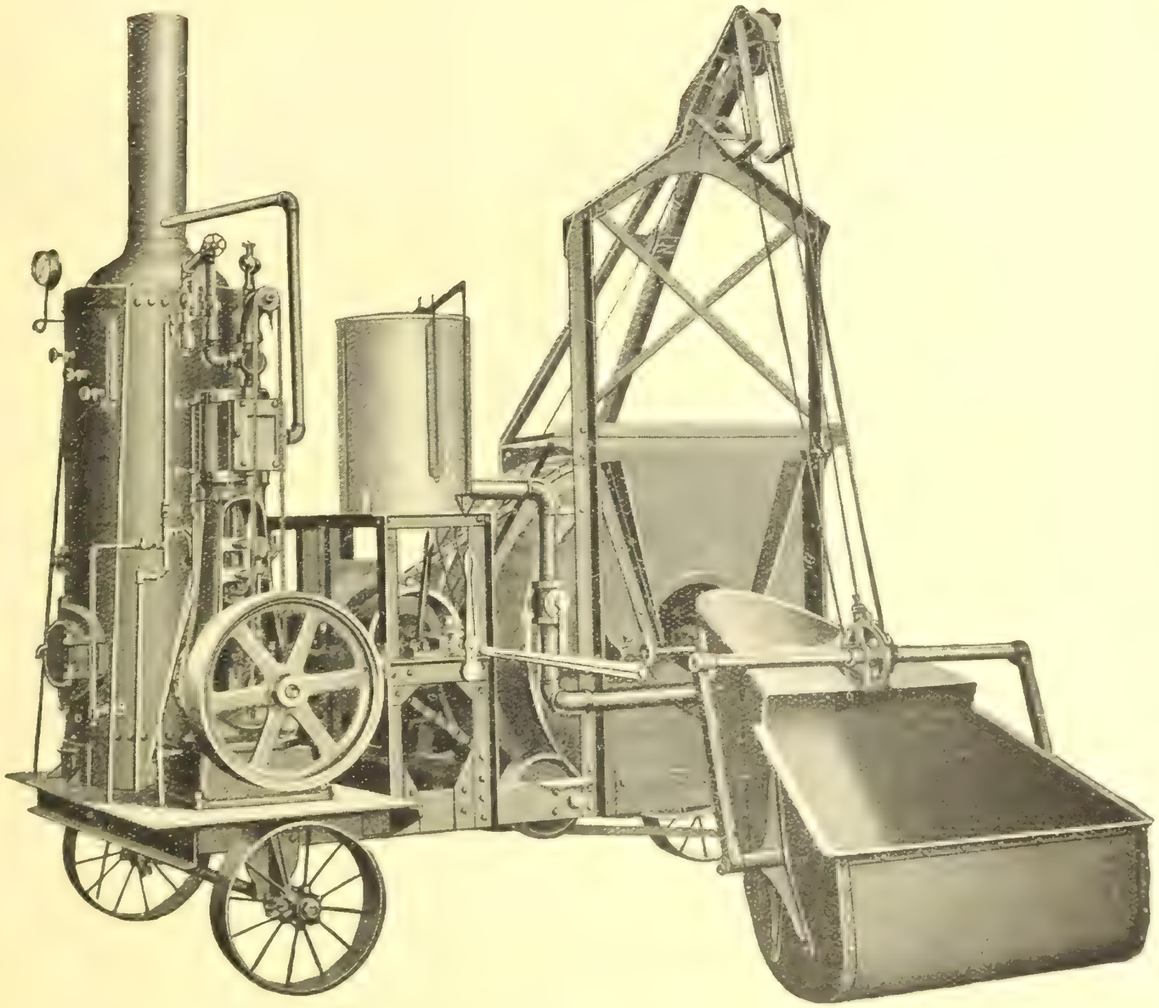
We also manufacture all types of Boilers, Marine and Stationery. Get our prices before placing your orders for Boilers, Bridges, Stand Pipes, etc. It will pay you.

Satisfaction Guaranteed

The Hunter Bridge & Boiler Co.

Limited

KINCARDINE, ONT.



CHAIN BELT MIXERS

are the choice of the contractor who appreciates the economy of purchasing only the best equipment.

THE FRAME is built of heavy steel and requires no blocking up.

THE DRUM is cast semi-steel with walls one half inch thick and will outwear several plate steel drums.

THE CHAIN BELT DRIVE by eliminating all gears requires less power and wipes out the most frequent repair expense.

There is a surplus of power and the drums are liberally rated as to capacity.

Our Catalog describes and illustrates every detail of construction so write for copy to-day.

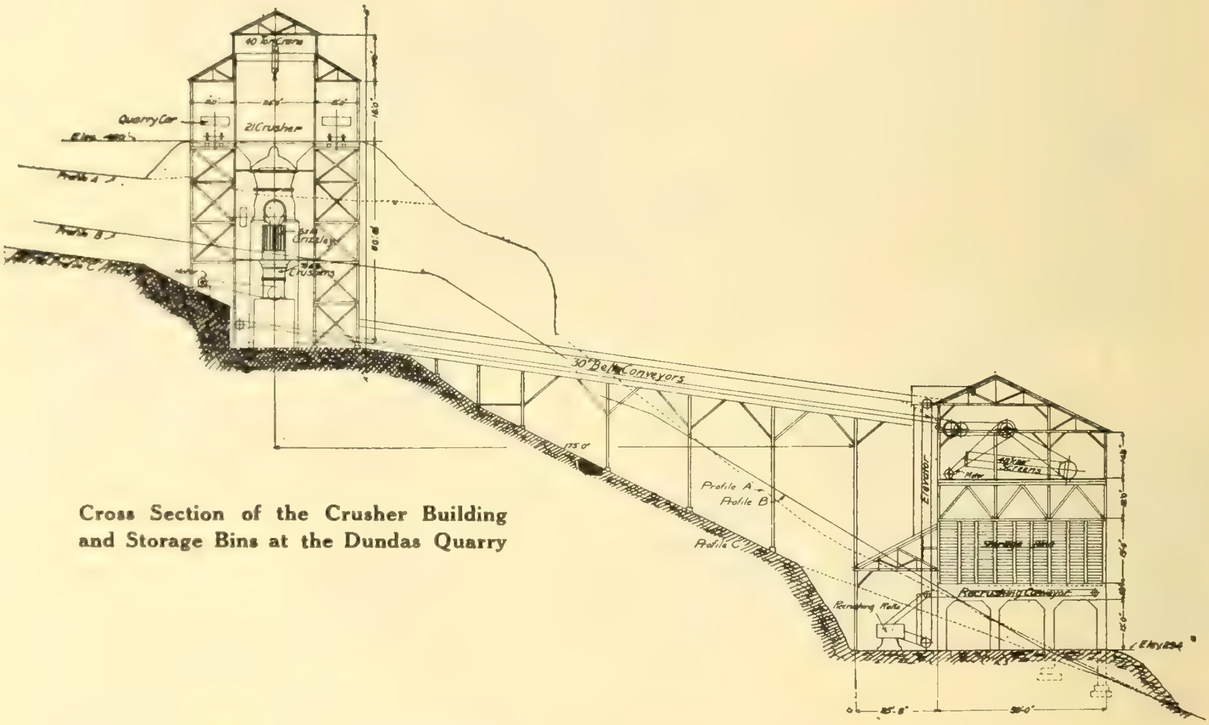
DOMINION EQUIPMENT & SUPPLY CO.

WINNIPEG, CANADA

Dundas Stone

All sizes for Concrete, Road Work, and Sidewalks

Flux Stone



Cross Section of the Crusher Building and Storage Bins at the Dundas Quarry

With a bin capacity of 3000 tons we can insure all our customers prompt delivery.

See description of new plant in this issue.

Doolittle & Wilcox, Limited

Dundas, Ont.

CHRISTIE, HENDERSON & CO., LIMITED

HEAD OFFICE: ROOM 5, 34 YONGE STREET.

TORONTO, ONT.

QUARRIES:
WHITE LIME;
GALT, ONT. SCHAW, ONT.
HESPELER, ONT.

QUARRIES:
GREY LIME; CRUSHED STONE;
KELSO, ONT. SCHAW, ONT.

PRODUCTS. We manufacture and wholesale WHITE and GREY LIME and CRUSHED STONE in various sizes.

CAPACITY. Our Lime Kilns have a capacity of four cars per day, and our Stone Crushing Plant ten cars per day.

SHIPPING FACILITIES. Our shipping facilities on either C.P.R. or G.T.R. are unsurpassed, and all orders are taken care of promptly.

SIZES. We furnish four sizes of Crushed Stone to meet various requirements, as follows:—

No. 1.—2" to 3", used in the construction of roadways and sidewalks, either in concrete or macadam. The standard specification for concrete when this size of stone is used "is 1 part cement, 3 of sand, and 5 of crushed, well mixed, with sufficient water to form a stiff mortar."

No. 2.—1½" to 2", used for foundation, retaining walls, etc. The specification adopted by the City of Toronto for this class of work, is as follows: "The proportion of cement, sand and broken stone in concrete used for footings or foundation walls shall be as follows: One part of portland cement to not more than two parts of sharp, gritty sand, and *five parts of clean stone, broken so as to go in any way through a two and one half inch ring.* The sand and cement to be mixed dry until the mass shall be of a uniform colour, then water to be put on and the mixing continued until a good mortar is formed, when the stone (after being dampened) is to be added and the entire ingredients turned over and over until they cling together in a pasty mass."

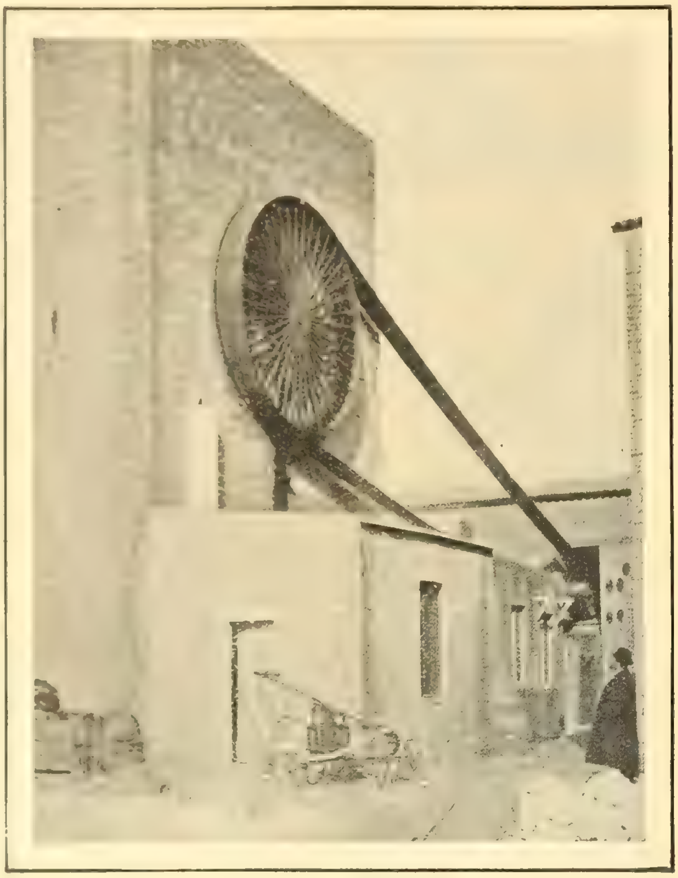
No. 3.—¾" to 1", used for reinforced walls, floors, etc. The proportion [illegible] two and five.

No. 4.—¼" to ⅜", used for stucco work and finishing columns, surfaces of sidewalks, etc. The specification for the smallest sizes is two, three and five, the double portion of cement giving a hard surface to stand the wear and exposure to the weather. This size is excellently adapted for roofing purposes in place of gravel.

DUST. We also supply Artificial Stone Manufacturers with a high grade Pulverized Stone which is guaranteed free of extraneous matter.

The above specifications [illegible]

Scandinavia Belting



Transmission

Scandinavia Belting

is a solid woven belt impregnated to resist moisture.

It is not made in plies and is made in any thickness up to 11/16 inch, and widths up to 66 inches.

It is equally good in WET or DRY places and is an ideal belt for Cement and similar plants.

Conveying

Federal Engineering & Supplies

Limited

284 Yonge Street, TORONTO

Agencies:

MONTREAL, Power Economies Ltd.
CALCARY, Great West Saddlery Co.
HALIFAX, G. B. Oland & Co.

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RETAW PROOFING

"WATER TURNED THE OTHER WAY"

A LIQUID MINERAL WATER-PROOFING

For

Cement, Brick, Stucco, Plaster and General Construction.

EASILY APPLIED with brush or spray.

PREVENTS EFFLORESCENCE, as it excludes moisture.

RETAW is absorbed, penetrating deeply, and upon evaporating forms insoluble and permanent crystals which fill and seal against moisture any porous surface.

From A Satisfied User

Mr. Porter's house was so damp he could not keep his tenants — the plaster and decorations were ruined by rain. He used RETAW; and writes us:

Milwaukee, Wis., Feb. 10, 1911.

The National Roofing Co.,
Tonawanda, N.Y.

Gentlemen,—I used your Water-proofing about two years ago on a cement house I own, and which I had a great deal of trouble with on account of the dampness that penetrated the walls every time it rained, in fact I was unable to keep a tenant in it any length of time, and I am glad to say that since using your Water-proofing on it I have had no trouble or complaint whatever. I am glad to recommend it.

Very respectfully yours,
GEO. Y. PORTER,
725 Washington Ave.,
Milwaukee, Wis.

Manufactured only by

THE
NATIONAL ROOFING CO.,

Manufacturers of Water-Proofing Asphalt Roofing and Paint

170 Filmore Ave., TONAWANDA, N.Y.

See our Exhibit at the Toronto Cement Show, Space 43, St. Lawrence Arena, March 6th to 11th

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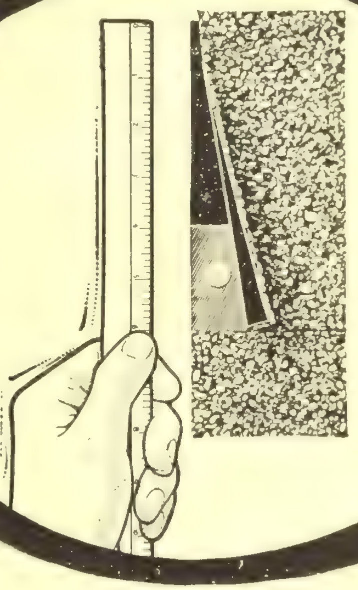
SIX INCHES of ASPHALT CEMENT-WELDED-JOINT



Instead of the ordinary, clumsy joint, easily broken and with all nail-heads showing, you can have an absolutely tight, six-inch weld, without a nail-hole through the roof, if you use

SECURITY WIDE-WELD ASPHALT ROOFING

PATENTED

The diagram above shows how the under surface of each sheet of roofing is lapped over the six-inch wide, ungraveled portion of the next sheet below, covering and permanently imbedding the nail-heads in a water-tight joint. The two sheets are firmly welded together with hard, mineral-asphalt cement. The finished roof is one continuous piece without a weak spot anywhere.

No Coal-tar Products or inferior volatile oils are used in Security Roofing. It is built up in layers of natural mineral-asphalt cement and long-fibred wool felt, saturated with natural mineral-asphalt by our own formula, the result of twenty years' experience. This makes the most durable and weather-proof roofing known.

Security Wide-Weld Roofing is Made in three styles:—Gravel Surface; Coarse Feldspar; and Fine Feldspar. It can also be furnished with burlap insertion for siding or roofs over one-half pitch. Anyone can easily apply Security Roofing, and it is perfectly adapted for use on any type of building.

There is a Security Agent in almost every town. Write us and we'll send name and address of the one nearest you.

Write for Free Book. "The Requirements of a GOOD Roof." It tells in detail why Security Roofing meets these requirements, and how easy it is to weld the patented 6-inch joint.

The National Roofing Co.

Manufacturers of Asphalt Roofing and Paint

Address communications to 170 Filmore Ave., Tonawanda, N.Y

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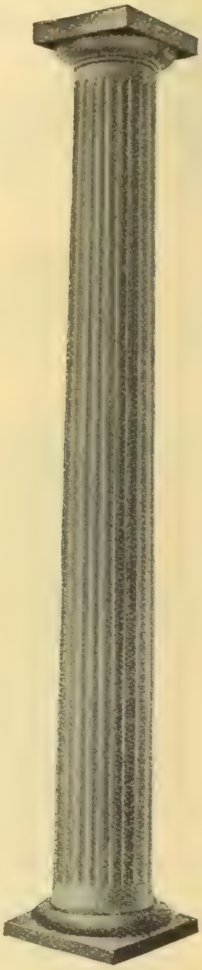

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We do not pretend to know all the secrets of successful contracting but we do know one

Use our
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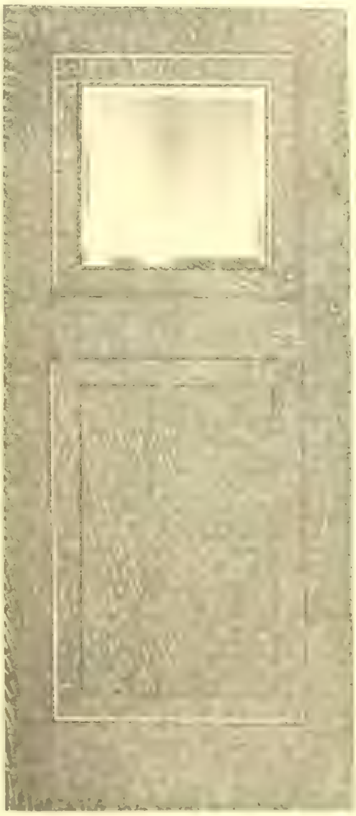
Wholesale **DOORS** **Retail**

We carry a large stock of Six Cross Panel White Pine Doors.

In any quantity and quality and can make deliveries immediately.

We can also turn out Veneered Doors in very short time. Any style or wood.



We also make a specialty of Trim, White, Red and Georgia Pine and all Hardwoods.

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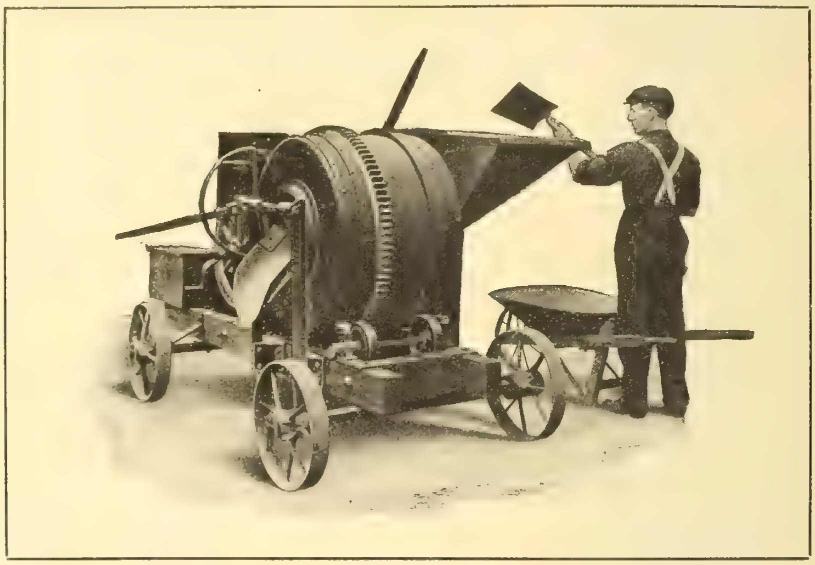

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in all sizes—all styles of power. "The best Mixers to be obtained." Marion Steam Shovels, Kilborn & Jacobs Dump Cars, Davenport Locomotives, Machinery for Railway, Dock and Sewer Construction, Mining and Contractors.

Write for Catalogues, Price Lists, etc.

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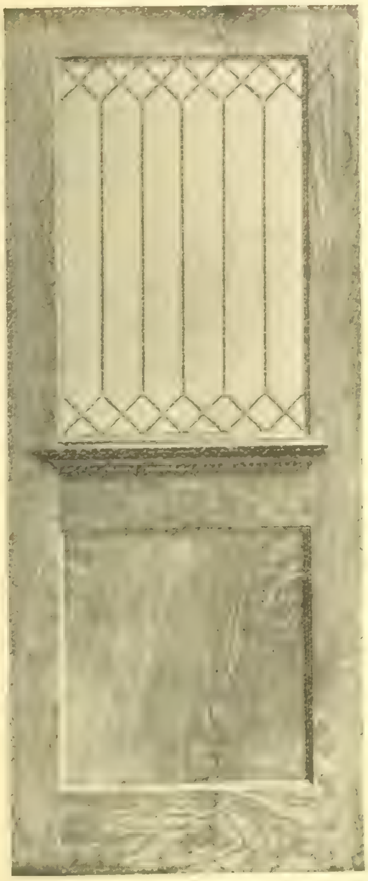

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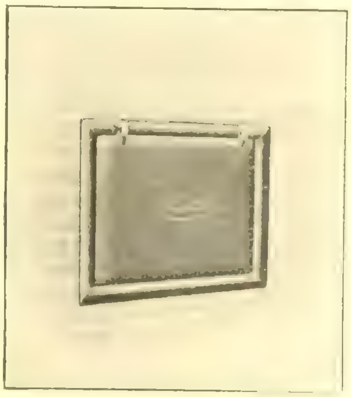
You'll find our Price is Right

The Bryan Manufacturing Co., Limited

Collingwood, Ontario

Equip Your Cellar

With one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. Another feature;



Majestic Chute Closed

with a 'Majestic' Coal Chute

is that the door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. It is positively burglar proof and can be opened only from the inside. These chutes are made to last. The body is made of heavy steel, thoroughly painted and protected, and the door and frame are made of the best quality of grey cast iron. Every part is made right, and that's why every "Majestic" Chute always works right. Its something every modern home needs. We make three standard sizes. There's a size that's just right for your cellar and your requirements.

No. 1 22 x 16 x 13 No. 2 27 x 16 x 13 No. 3 33 x 22 x 18

Send for our illustrated booklet, [illegible]

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THE DOWN DRAFT FURNACE CO., LIMITED

Galt, Ontario. Canada

"Complete Outfit Will Be Sent Upon Receipt Of Price $7.50"

THE

Standard Automatic Brush

does your painting work in a new way, better, quicker, cheaper, eliminating all waste of paint. An equal flow at all times; thickness of coat can be accurately adjusted. Absolutely clean and fireproof.

THE STANDARD AUTOMATIC SYSTEM

does away with the paint can. It eliminates the dip and is far superior to the spray, but it does rub it in. No air pressure is needed. Will work with any kind of paint. Get next to this new method. Made especially for manufacturers of automobiles, automobile bodies and wheels, all kinds of vehicles, carriages, etc. It is most useful for manufacturers of furniture. It will also save a lot of time in painting structural work, such as bridges, elevated roads, etc. House and sign painting can be done effectively and quick.

Wherever duplication of work exists, this device will increase your output and reduce the cost. Buy just one outfit to-day and be convinced. We are sure that we will have to equip your entire plant. Special equipments can be made to suit your purpose.

Complete outfit consisting of a large paint tank, either stationary or movable, with automatic valve and six feet of flexible tubing together with the automatic adjustable brush made of aluminum, costs $7.50, and it is still cheaper than the ordinary brush.

The outfit is also made with a tank to be strapped on the back which will cost $2.50 extra.

Our booklet will tell you why. Write for one to-day. Send in your order. Your outlay will only be once. Apparatus will last a life-time. Let us know to-day what you are manufacturing and we will effect a saving for you.

Jobbers and Dealers wanted everywhere.

Standard Automatic Manufacturing Company

50 CHURCH ST., NEW YORK.

Hydrated Lime

Bulletin No. 1

Every good thing that has ever been invented has passed under the fierce light of public criticism. And hydrated lime has not escaped it.

Not many years ago it was the common belief that Portland cement, sewer pipe, and other such products could not be made to advantage in Canada. But time has demonstrated the foolishness of those beliefs.

The Hydrated lime industry is bound to come to the front in Canada just as the manufacture of Portland cement has done, because most of the difficulties of manufacture have been eliminated, and hydrated lime can therefore be made in Canada just as well as it is made by progressive manufacturers in other countries.

The opportunity for the betterment of concrete construction is so evident that every person interested in the subject whether architect, engineer, contractor or dealer cannot afford to miss being posted on the advantages of hydrated lime as a means of improving all kinds of cement mixtures. It is not expensive, and by its simple application, the difficulties that have so long beset cement work may be effectually mastered.

Are you an ARCHITECT? Then you are striving to overcome the dull gray color of concrete, and to make it pleasing to the eye. Hydrated lime will do this for you, and it won't cost you more either. A small proportion in the aggregate noticeably whitens the color of construction and besides imparts to it a toughness that eliminates the brittle texture developed by cement alone.

Are you an ENGINEER? If so you want every concrete bridge or retaining wall that is built under your supervision to be strong and permanent.

To be permanent, it must be waterproof. Hydrated lime will accomplish this for you. Instead of depending upon foreign substances to accomplish this purpose, isn't it reasonable to argue that the practical way is to make the concrete itself so dense that water cannot penetrate it? This is just what hydrated limes does. It fills the voids and small air holes left by the evaporation of the water in the aggregates and completely seals the concrete against the entrance of all outside moisture. It actually increases the strength of all cement mixtures, which harden in air, by preventing them from drying out too rapidly and restores the cement to its normal hydraulic state with maximum of strength augmented.

Are you a CONTRACTOR? Then it will interest you to know that it costs you valuable time and money to do the very thing that hydrated lime will do for you by itself. You can use hydrated lime in cement mortars. It is as easy to use as the cement itself and costs you nothing extra to incorporate it in your mortar. For the fact of the matter is, hydrated lime is cheaper than cement. You can actually substitute nearly half of the cement with hydrated lime and still get a mortar that is twice as strong and infinitely easier to mix and trowel. Three times as many brick can be laid in the same time with a cement lime mortar made out of hydrated lime. In heavy concrete construction, the aggregates are more easily made and placed in the forms when hydrated lime is employed. The Hydrate overcomes the frictional tendency on the part of the cement, thus allowing the fresh concrete to be more densely pressed together, with a great deal less effort. Then you get the result you are after, too. That is, a waterproof job.

Are you a CEMENT BLOCK MANUFACTURER? Then you are trying to reduce the cost and improve the quality of your artificial stone, you will find that hydrated lime will solve the problem for you. It makes cement blocks whiter, harder, tougher, cheaper and waterproof. All this is what you have been racking your brains to find the way to do. Now that we have told you the secret, it is up to you to get busy. Do some experimenting. The man who reads this can make up his mind that it is based on established facts. For prominent engineers and chemists have already demonstrated what a valuable addition hydrated lime is to cement construction. The ideal condition is reached when hydrated lime is used, because it waterproofs and increases the strength, improves the appearance and facilitates the working of cement concrete, and the best part of it is that not a cent of additional expense is incurred, while in many cases the cost is actually reduced.

OUR BUSINESS is the designing and constructing of hydrating plants to make this up-to-date product. We have the only process that has proved successful in hydrating High Calcium and Dolimite Limes. We have been connected with the construction of over 40 plants, no two of them alike; every one built to meet local conditions. While our prices may seem high as compared with others, we only, with our experience, are in a position to contract and install a plant for you GUARANTEEING Definite Results. We GUARANTEE where others Promise.

It requires about 4 months to build a plant. Why not take this matter up now and get ready for next season's business?

Our hydrated lime booklet tells a very interesting story that is worth dollars and cents to you. Send for it to-day.

The Kritzer Company

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We beg to announce that we have erected a most modern and up-to-date mill in **Hamilton** for the production of

Steel Bars for Re-inforcing Concrete

These Bars are made in **Plain, Round Squares, and Twisted Squares** from Steel which has a **High Elastic Limit.** We can give prompt delivery. Also manufacture **Round, Square, Flats, Angles and Special Shapes** for all purposes.

Please ask us for **Prices.**—We are independent of **any Merger.**

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If the specifications call for metal ceilings, make your customer more satisfied and add to your reputation by selecting Preston Steel Ceilings. Thus you will make good for sure on that part of the construction.

You should induce your customers to build or repair with metal ceilings rather than with plaster. For only a metal ceiling is fireproof and sanitary, as well as permanent.

In Preston Steel Ceilings the choice lies among over eleven hundred up-to-date designs. Each is deeply embossed, the patterns clear-cut, and the finish perfect.

Preston Steel Ceilings

Other building specialties we carry in immense stocks include Metal Shingles, Siding, Corrogated Sheets, Skylights, Ventilators, Finials, Herringbone Lath, Fireproof Windows, Canada and Terne Plate, Black Sheets, Copper and Galvanized Sheets, Gravel Roofing, Tinners' Supplies, etc., etc. Prompt shipment at all seasons.

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Steel Bars for Reinforcing Concrete

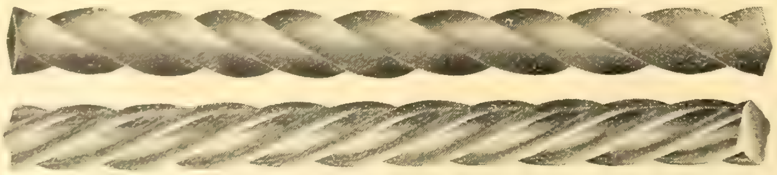
Plain, Round, Square, Flat, Twisted and Spiral Bars. Channels for Fireproofing

Squares and Rounds 3-8 in. to 1 1-4 in.

Elastic Limit 50,000 lbs. or Higher

Immediate Shipment from Stock

Cut to Required Lengths



HIGH ELASTIC TWISTED BARS FOR REINFORCING CONCRETE

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"Champion" Rock Crushers

"Equal Work with Half the Speed"

Don't buy a Rock Crushing Plant until you see the **"Champion"** Crusher with its exclusive feature—the elliptical cam which gives the jaws two motions instead of one and makes it necessary to only run the crusher at half the speed others require.

Speed means friction—friction means wear. **"Champion"** Crushers by doing the work at half the usual speed save wear and therefore outlast others.

"CHAMPION"

Dump Waggons

Wheel base 6 to 14 inches shorter than any other. You can get this waggon into and out of places without a hitch where other waggons will give all kinds of trouble.

Accidental dumping impossible—instant dumping when wanted. And these are but single features. Learn the others before buying your next waggon. **"Champion"** Dump Waggons are beyond any question the best waggons on the market.

Send for our catalogues on **"Champion"** Crushing and Road Building Machinery and Dump Waggons. If you value extreme efficiency and durability get these catalogues now and read them.

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American Road Machine Company of Canada, Ltd.
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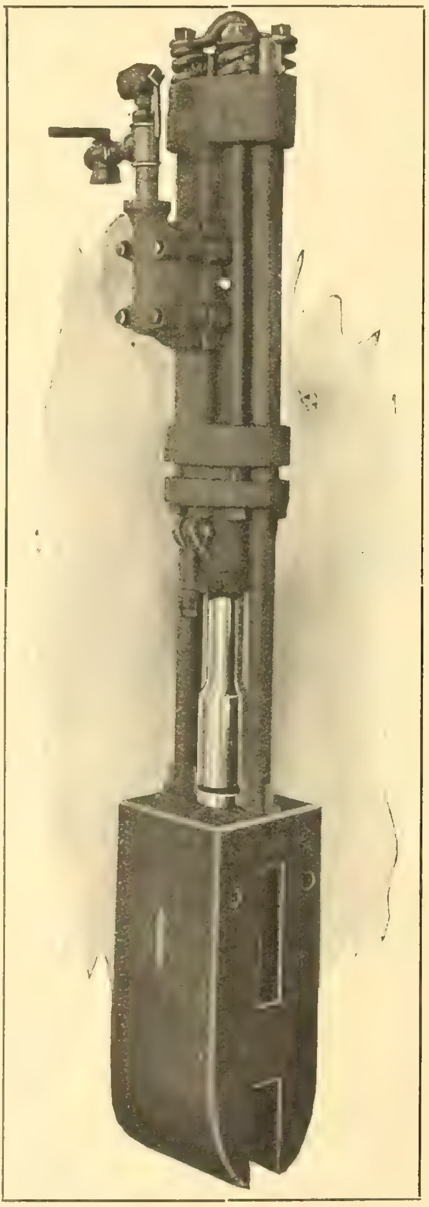
SHEET PILE DRIVERS

In Trench excavation for Sewers, Water mains, or where any depth must be reached in a material with a tendency to cave or where water is encountered, sheet piling is essential.

In sinking coffer dams where mud or quicksand is involved, success depends upon the proper driving of the piling.

Where a heavy hammer with a powerful blow is used on sheet piling too much energy is consumed in vibrations and springing of of the piling. Frequent accompaniments of the heavy pile driver are broken wood piles, bent steel piling and rapid brooming of the top and loss of alignment.



The Rand Sheet Pile Driver

Eliminates the Trouble from buckling of the pile, cramping and loss of alignment and broken piles. This method of driving with a heavy anvil block interposed between the pile and the hammer, which receives the many rapid, sharp but comparatively light blows, does away with brooming, springing and vibrations and the rapid successions of impulses is applied entirely in penetration.

This is a simple, efficient machine of great capacity with the number of working parts reduced to the limit of consistence.

Pamphlet K—139

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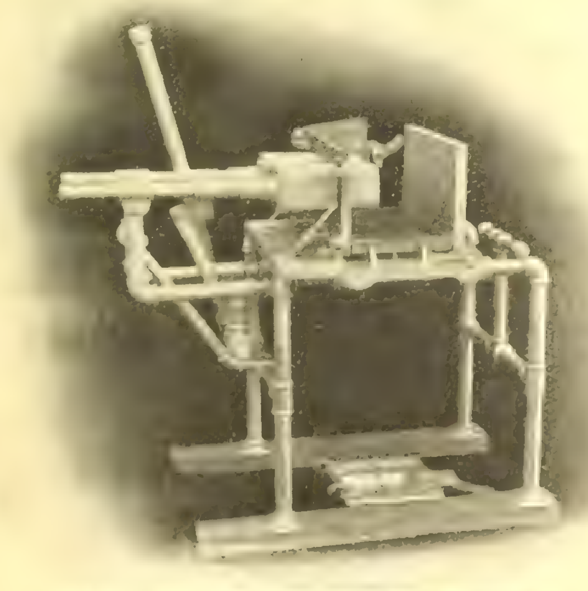

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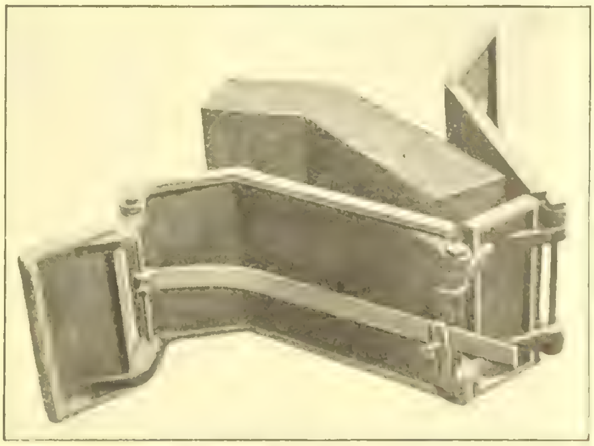

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This mould will make blocks with any angle from 20 to 60 degrees in 8 or 9 inch height without having to change any parts other than for adjustment. A great many of these moulds have been sold.

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If you want something that will stand the wear and hard knocks use

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The EASIEST of all floors to repair

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LOCOMOTIVES	1-18″ x 26″ cylinder Mogul, Standard Gauge, and 18-10″ x 14″ Vulcan and Davenport dinkeys, 36″ Gauge. All recently repaired and in excellent condition.
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SCRAPERS	–Drag-Scrapers an 4—Wheel Scrapers.
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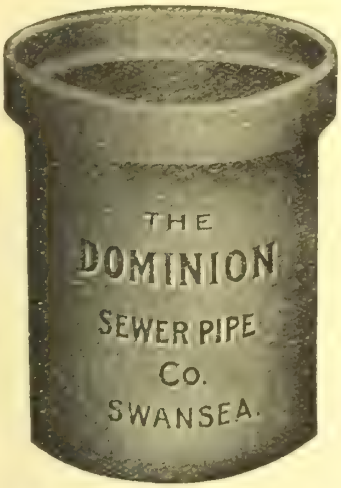

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a cheap article when low cost is its only recommendation, generally gets just what he pays for or less. Where **Public Health** and **Public Convenience** are at stake, good sewer pipe are **Cheap at any Cost.**

VITRIFIED **Mimico Pipe** SALT-GLAZED

are cheap as compared with others if you consider **Service**, but dear if the first cost is all that worries you.

We would rather have it said that our pipe are "Dear but Good" than that they "are cheap but only fair in quality."

**We don't MEET all comers
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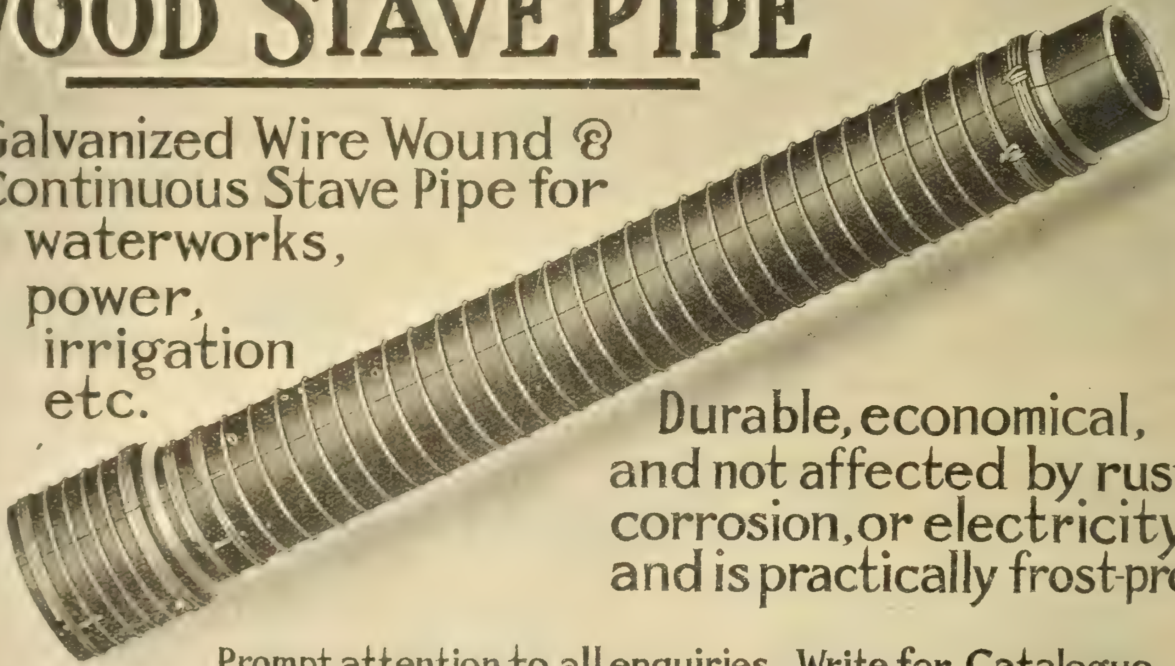

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Galvanized Wire Wound & Continuous Stave Pipe for waterworks, power, irrigation etc.

Durable, economical, and not affected by rust, corrosion, or electricity, and is practically frost-proof.

Prompt attention to all enquiries. Write for Catalogue.

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(Excerpt from Address about Street Pavements by J. W. Howard, C. E. E. M., of New York, before the Associated Organizations at the Business Men's Club, Cincinnati, Ohio, U.S.A., published March 30th, 1910, in "The Enquirer".)

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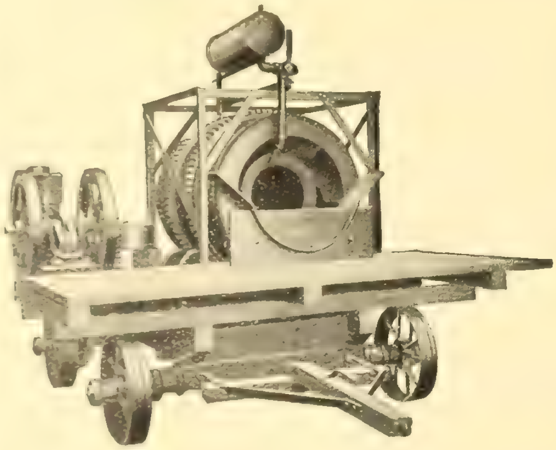

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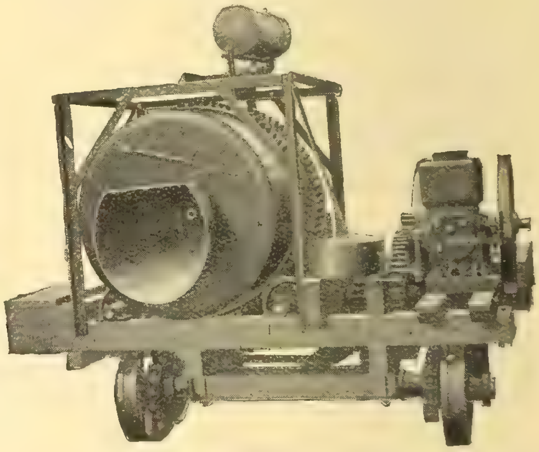

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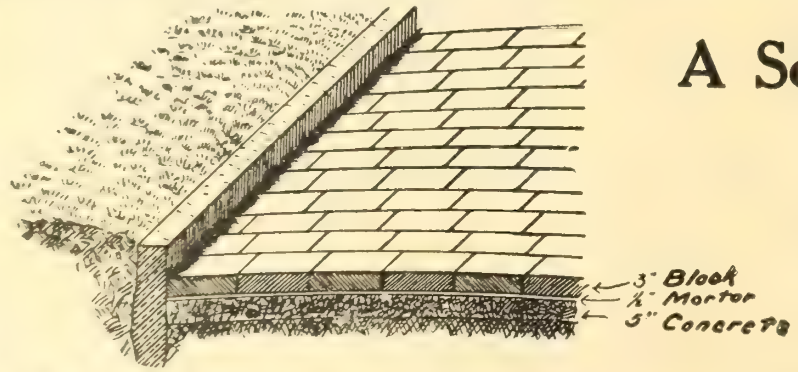

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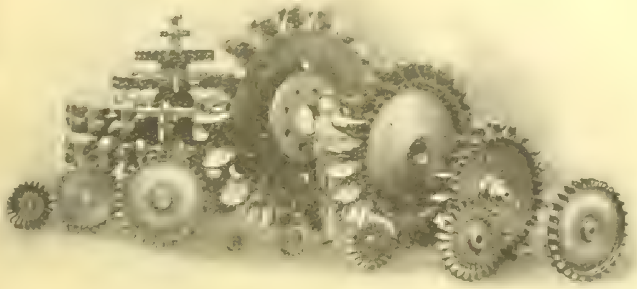

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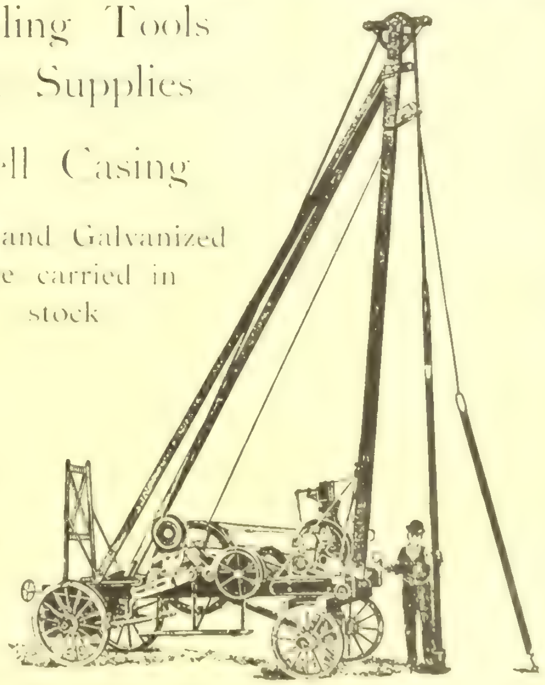

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The following are wholesale prices delivered at Toronto:—

	Per B.
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work....	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches......	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50

Brass Goods, Valves, etc.

96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES.

(Installed in Toronto.)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—½-inch square, 65 cents.

Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

Vitreous Tile—All sizes, according to color, 55 to 65 cents.

Glazed—White, 6 x 3 inches, 55 cents per square foot.

Matt—Dull finish colors, first, 70 cents.

Capping Coves and Corners, special quotations to suit requirements.

Opalite Tile—3-16 inch No. 1 standard, size 6 x 3 inches, 6 x 2 inches, 60 cents.

White glass, installed, 6 x 3 inches, 30 cents.

STEAM FITTERS' AND PLUMBERS' SUPPLIES.

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 70 per cent.; roundway, 65 per cent.

No. 4 compression bath cock ....net	$1.65
No. 4½ Fuller's ....net	2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range.

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks.

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe.

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.45
¾ inch	3.28	¾ inch	4.45
1 inch	4.70	1 inch	6.55
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.55
4 inch	30.78	4 inch	41.55

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

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Medium and extra heavy pipe and fittings, up to 6-inch, 75 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 per cent.; fittings, 70 and 10 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.70.

Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.40.

Binder stone, $1.35 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Brown sills and beads, in the rough, delivered, 40 cents per foot.

Rubble stone in car lots, $1.30 per ton.

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Steel channels and beams, $2.60 per 100 pounds, delivered f.o.b. Toronto.

Expanded Metal, No. 10 gauge, 3½ cents per square foot.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $2.20.

Manilla Rope, best, per pound, 15 cents.

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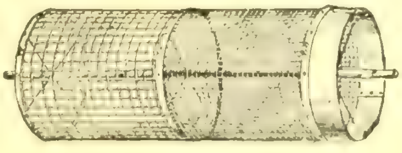
Revolving Screens



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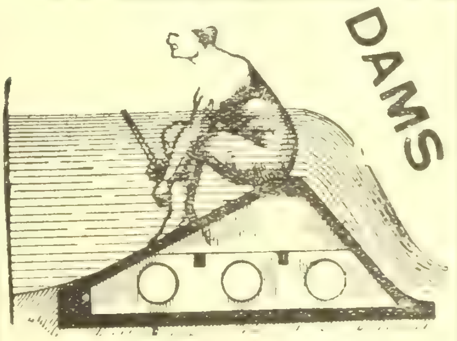

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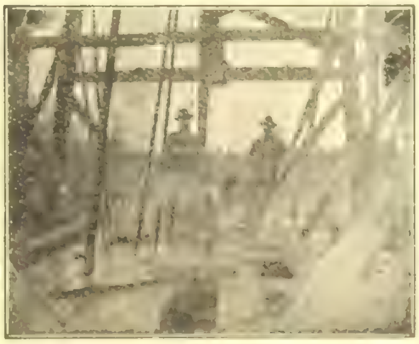

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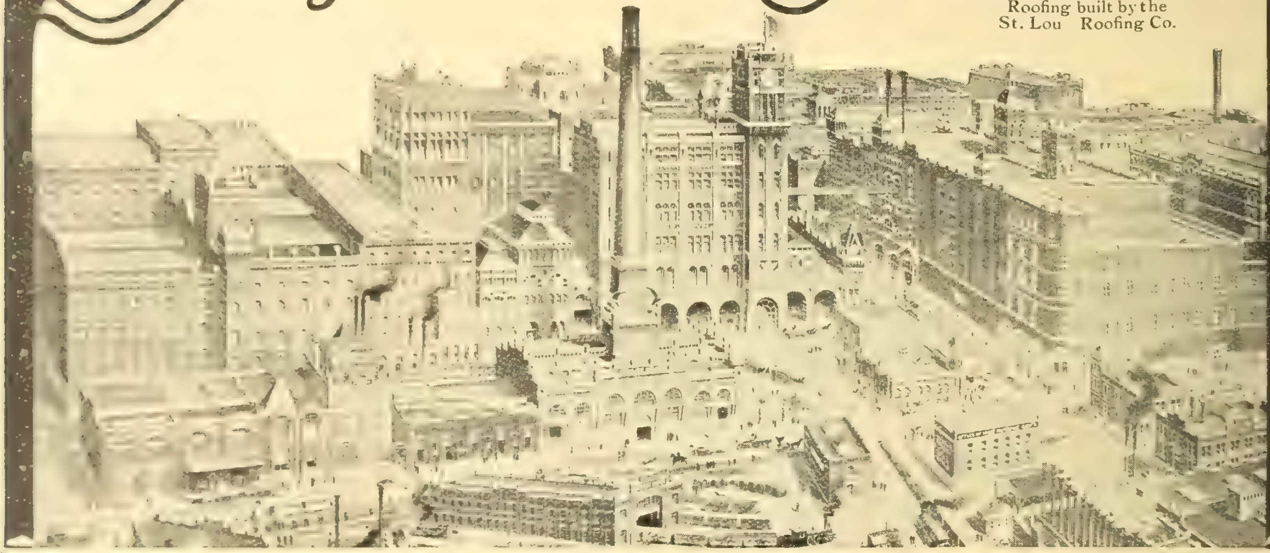

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Roofing built by the
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Over 50 Years of Satisfaction

When big roofs are under consideration, ultimate costs are carefully figured. Barrett Specification Roofs win on the figures every time and for that reason most of the large manufacturing plants in the country carry roofs laid along the lines of this Specification.

The enormous plant illustrated above is a typical instance. It is the Anheuser-Busch Brewery at St. Louis, covering 70 acres, equal to 35 city blocks. 99% of these buildings are roofed with coal tar pitch, tarred felt and gravel laid along the lines of the Barrett Specification, the other 1% being steep or ornamental roofs.

The durability of these roofs has averaged over 20 years and the net cost per square foot per year of service has been lower than that of any other roofing material.

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Whenever the area is large enough to set engineers and architects to looking up ultimate roofing costs, Barrett Specification Roofs are invariably used.

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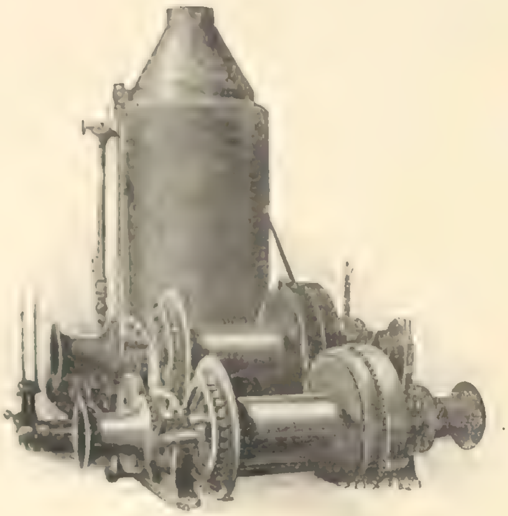

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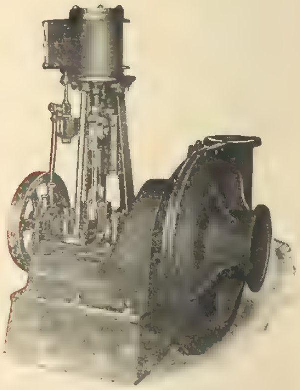

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Municipal Progress, Advance Information

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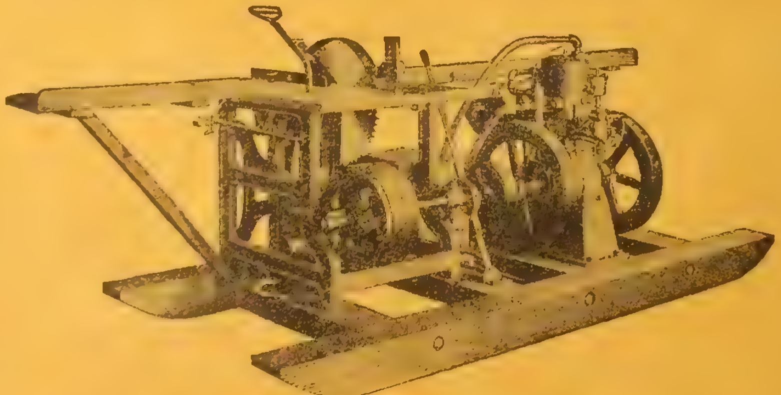

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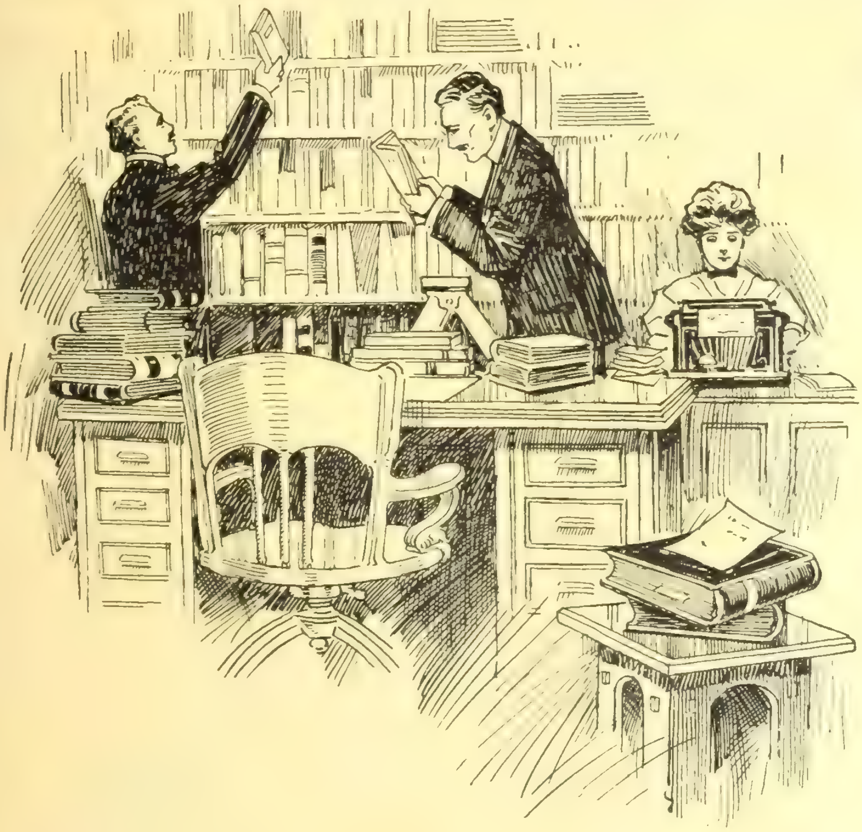

It is perhaps not generally known

that we have an Information Department consisting of trained and practical men, whose time is employed solely in answering enquiries from people interested in cement.

Now it will be readily understood

that out of the mass of enquiries that come to us, there are a number that include questions as to what might be termed Allied Industries. These we now answer to the best of our ability, but we could answer them still more satisfactorily, if manufacturers of materials used in conjunction with cement would co-operate to the extent of sending copies of their catalogues and other literature to be placed on file in our office for reference.

We should like to obtain

the names and addresses, together with catalogues, and any other obtainable information of manufacturers of and dealers in:

1. **Concrete Machinery**
2. **Building Blocks**
3. **Cement Bricks**
4. **Tile Molds**
5. **Fence Posts**
6. **Re-inforcing Material**
7. **Water-proofing Compounds**

It is not alone for our own convenience that we make this suggestion; firms who manufacture or deal in such articles will find it to their own advantage to have this information in the hands of our Information Department, thereby enabling us to hand on to them from time to time enquiries for such materials as they severally make.

In sending catalogues, literature or information, please address same to "Sales Department."

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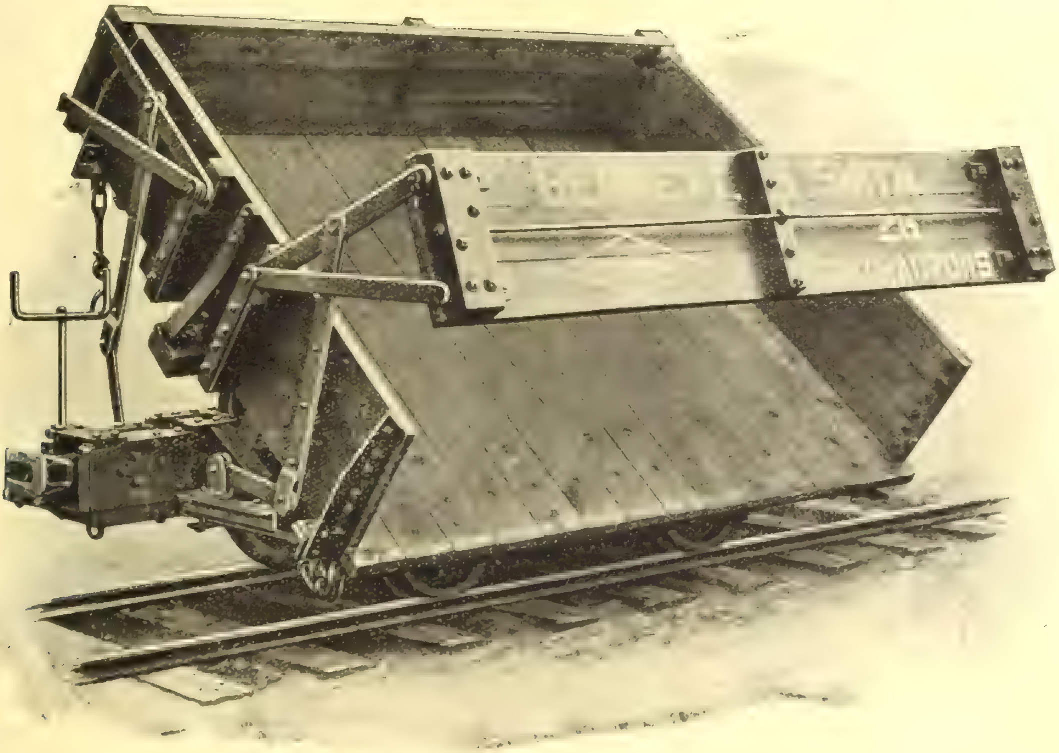

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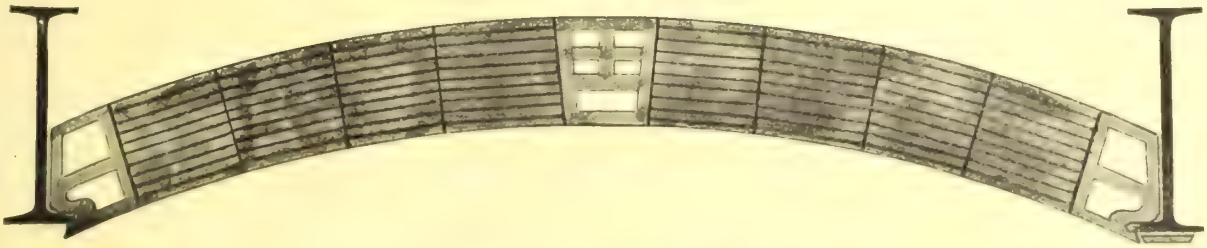

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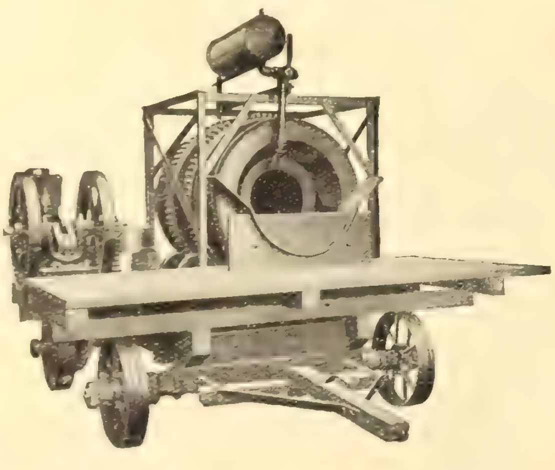

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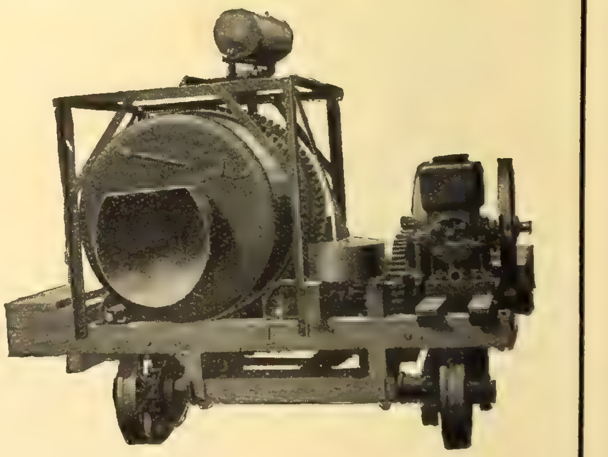

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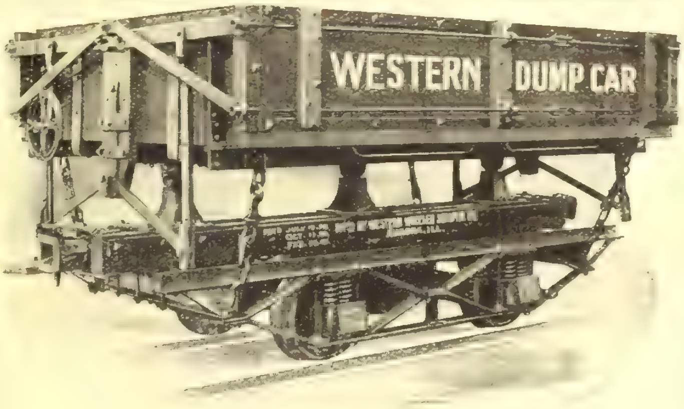

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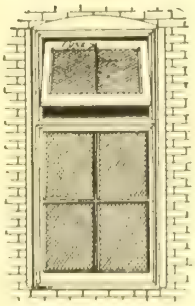

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We manufacture Highly Glazed and perfectly Vitrified "Standard" and "Double Strength" Sewer Pipes and make a specialty of Double Strength Pipes for Railway Culverts.

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Fire Clay Goods, Stove and Range Bricks, Boiler Tube Bricks, Locomotive Blocks, and all kinds of "Special Shapes."

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Ceresit is a cream white paste readily dissoluble in water. This water is used instead of plain water for mixing Cement, Mortar or Concrete.

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Salt Glazed and Vitrified
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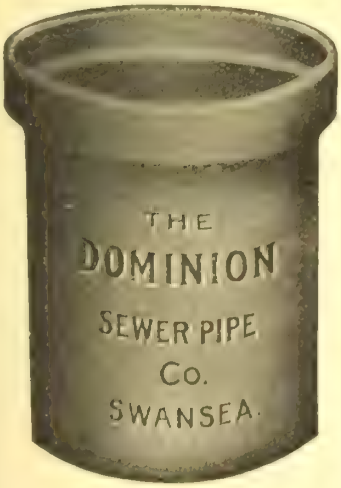

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We can serve you best. Our prices are right. The quality of our goods is of the highest excellence. We are the largest manufacturers of **Vitrified Salt Glazed Sanitary Sewer Pipe** in the world. Sizes, 3 in., 4 in., 5 in., 6 in., 8 in., 9 in., 10 in., 12 in., 15 in., 18 in., 20 in., 22 in., 24 in., 27 in., 30 in., 33 in., 36 in., 42 in. Lengths, 2 to 3 ft. Socket, Standard or Deep and Wide. Thickness in sizes 15 in., to 42 in., both Standard and Double Strength. We also manufacture Flue Lining, Wall Coping, Vitrified Conduit, Vitrified [illegible], Facing Blocks, Drain Tile, etc.

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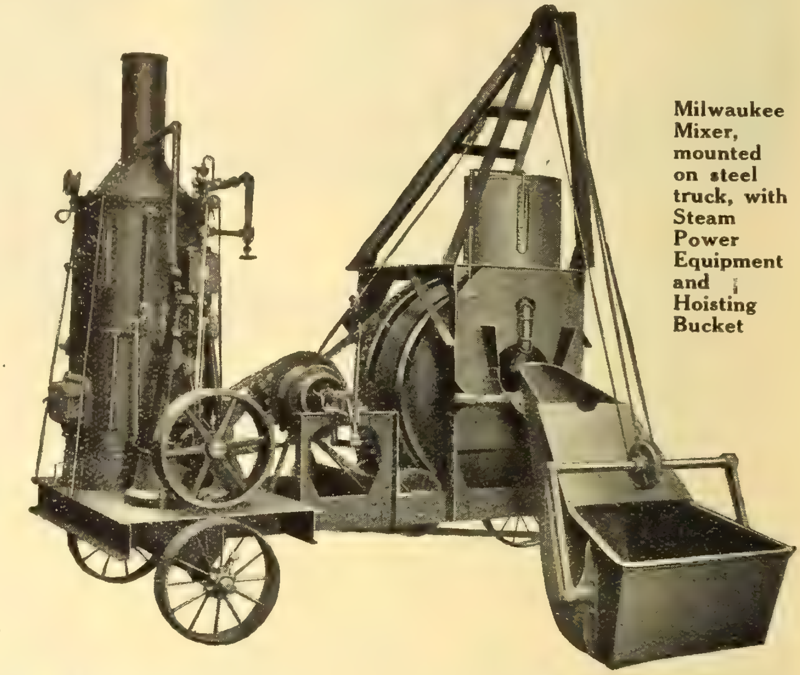
Rosebery's Unequaled Proposition and one that is booking the orders. Write for 1911 Catalogue. Just out.



Milwaukee Mixer, mounted on steel truck, with Steam Power Equipment and Hoisting Bucket

OUR PROPOSITION

WE will put a Milwaukee Mixer on your work for a period of five days. You are at liberty to test it thoroughly in every kind of work. If, at the expiration of this time, you are not fully convinced that it is all we claim and superior to any concrete mixer in the market, return it to us and we will pay the freight both ways.

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Milwaukee Concrete Mixer and Machinery Co. - Milwaukee, Wis., U. S. A.

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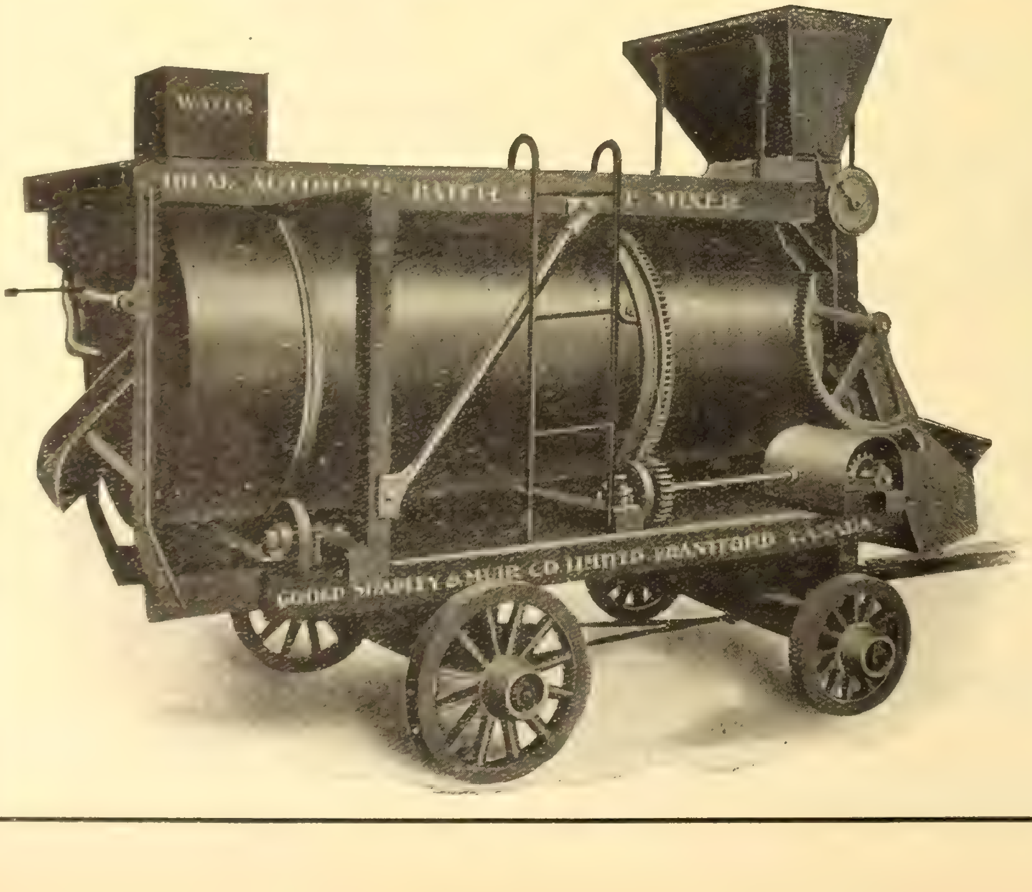
CONCRETE MIXERS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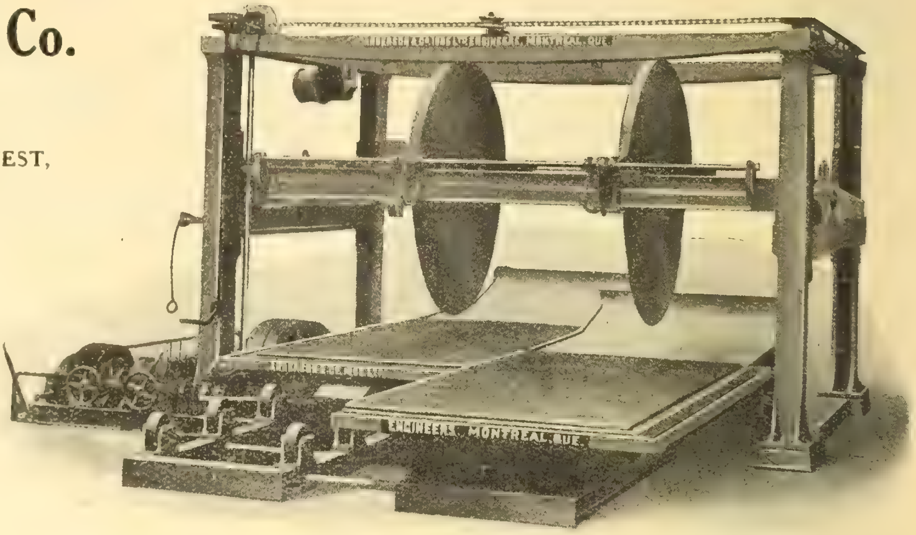

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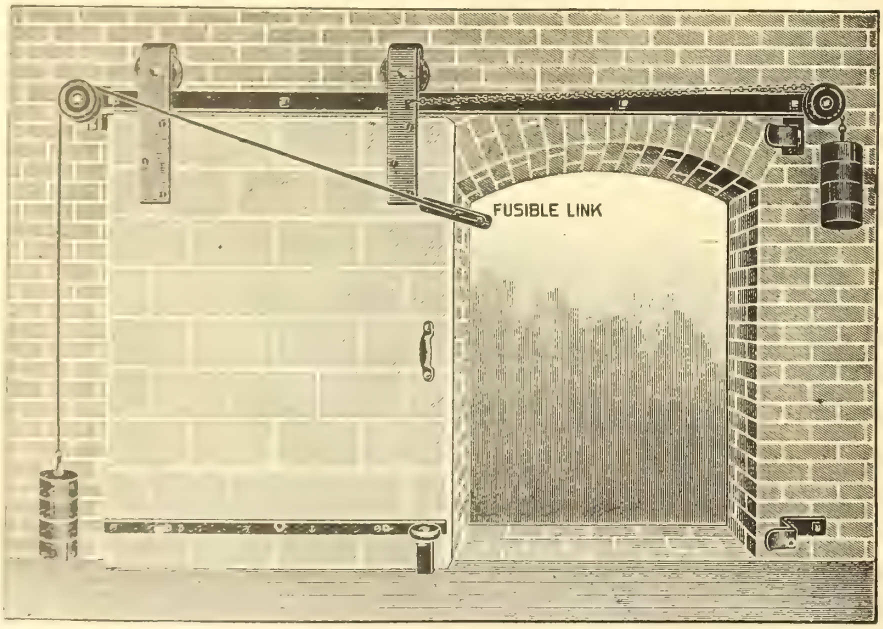

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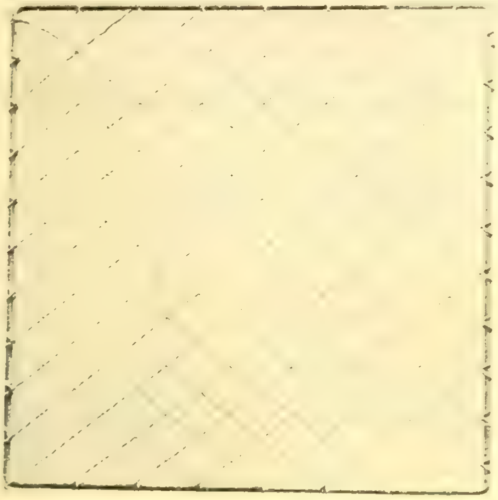

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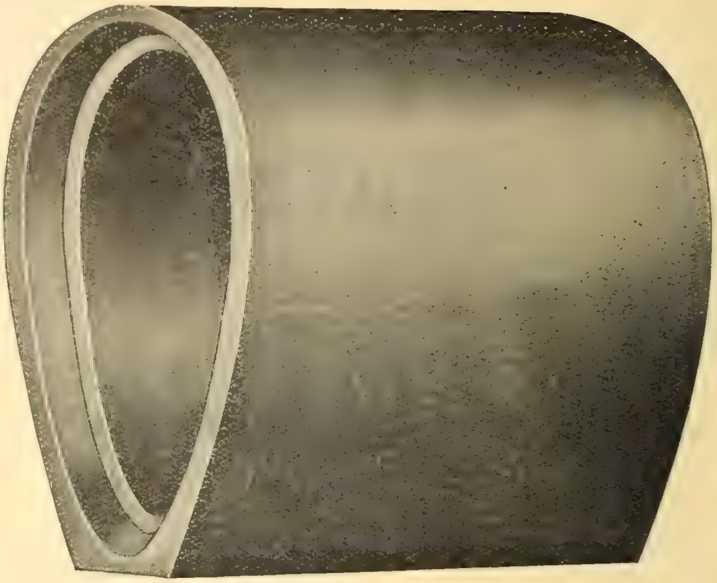
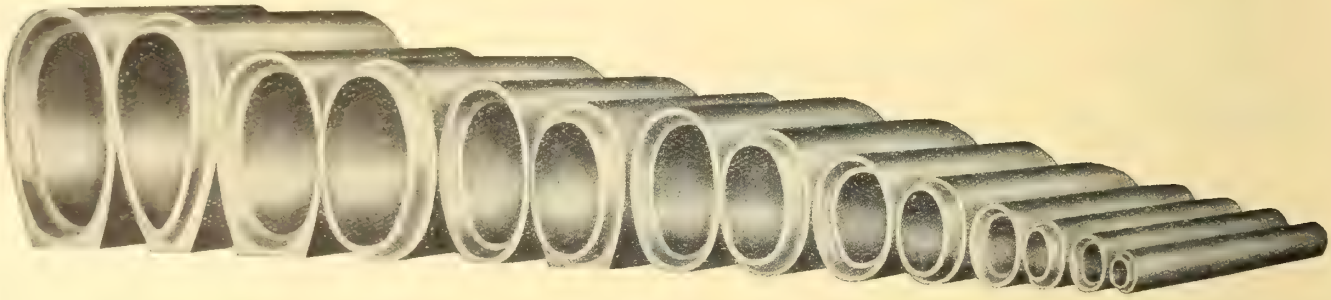
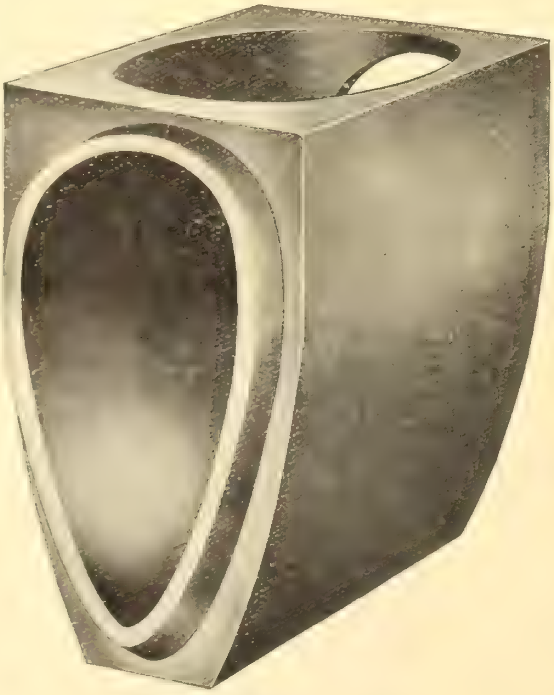
In **Duluth** brick sewers failed after seven ears so as to require replacement. **Concrete** sewers put in at the same time are **intact.** In **Millwaukee** after 25 years concrete pipe was found better than when new. Of 300 miles of sewers in **Millwaukee** over 200 miles are of **concrete.**



Section of 2' x 3' pipe





Man-hole Section of 2' x 3' pipe

Concrete sewers abound in **England** and **Germany**. The modern **sewers** of **Paris** are all of **concrete**. American cities have adopted it. **Brooklyn** has hundreds of miles of it with not a single failure, whereas even Scotch vitrified pipe has been found to have deplorably failed there. **Toronto,** after much hesitation, is now in line with concrete. Why be the last to join the ranks you eventually will and must join ?

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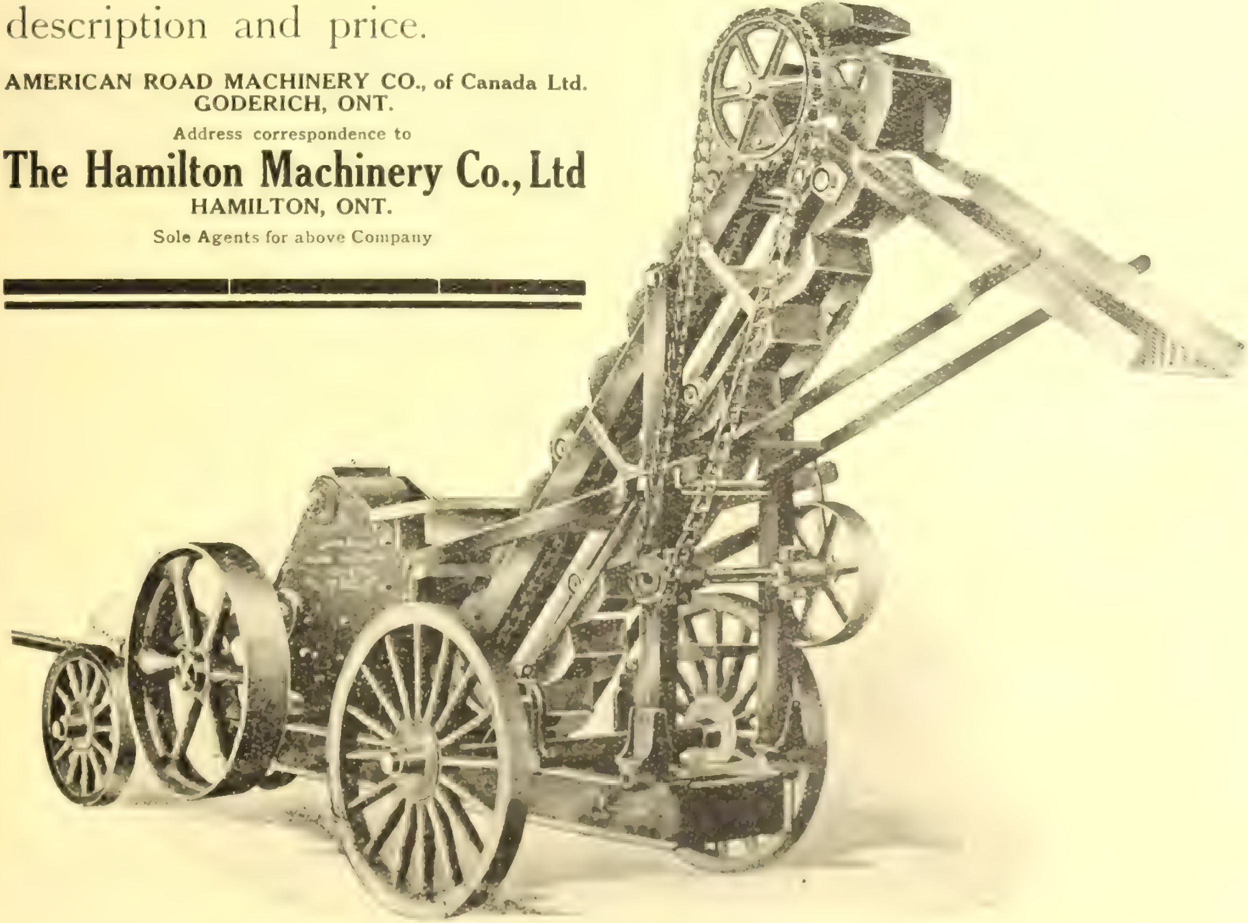

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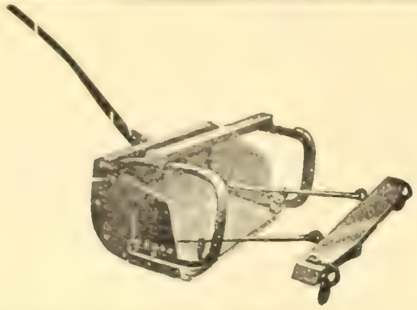

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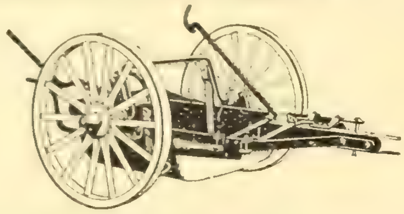

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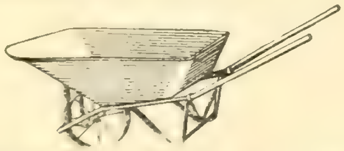

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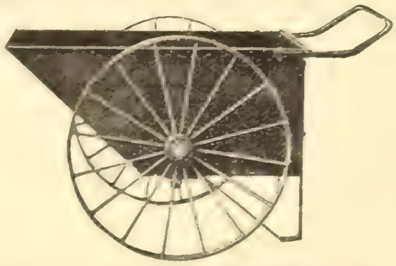

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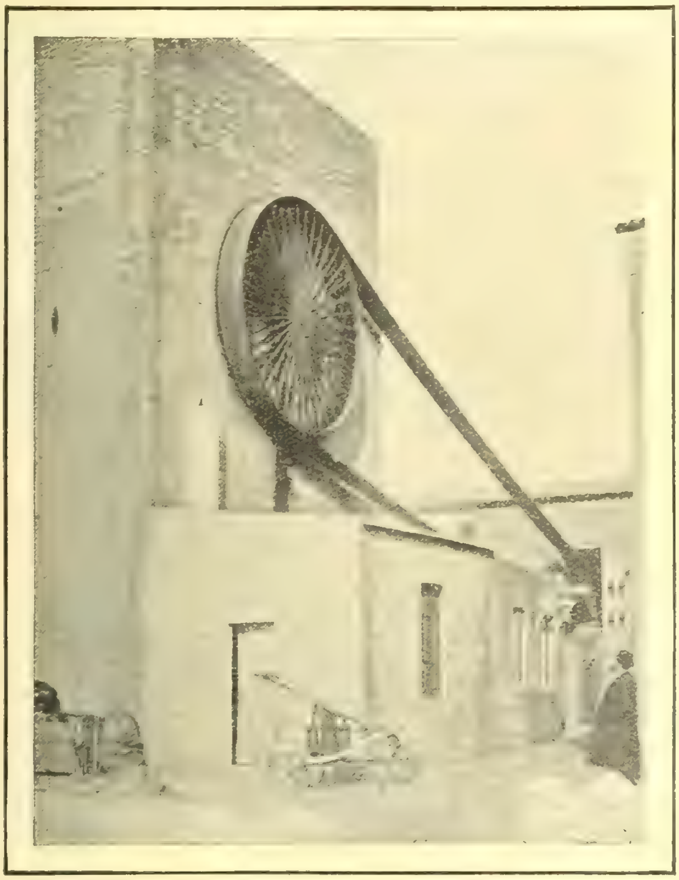

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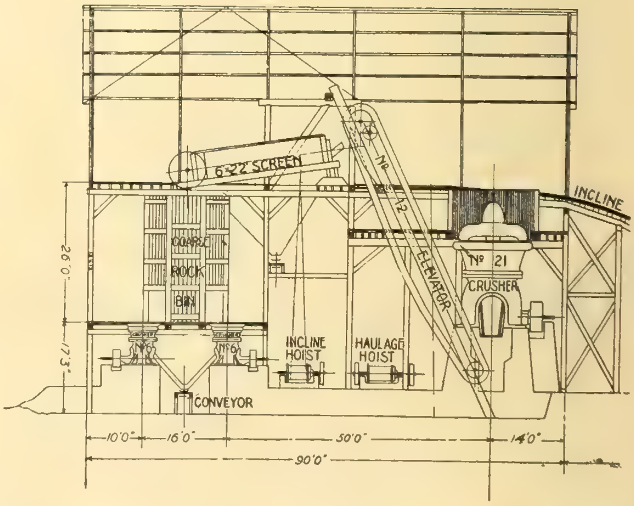

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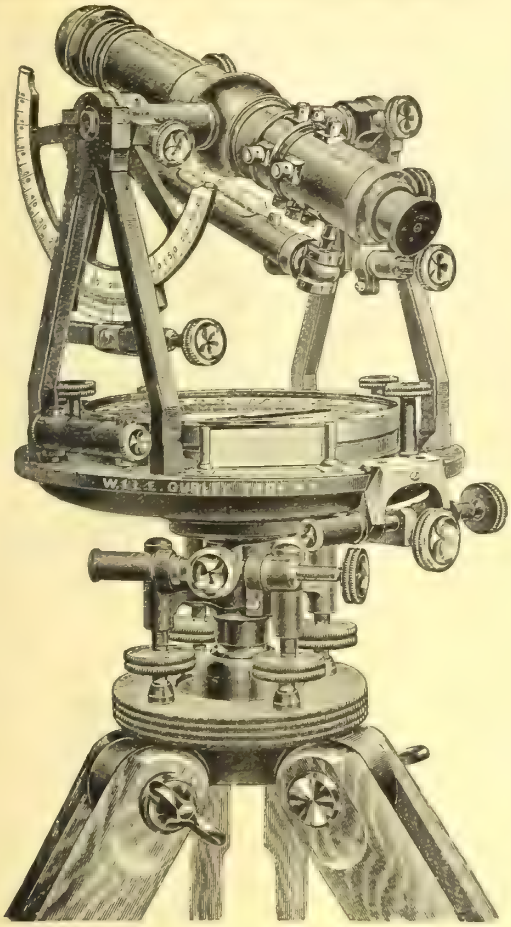

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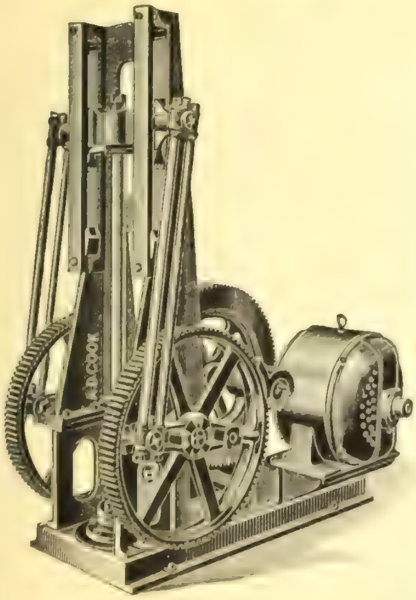

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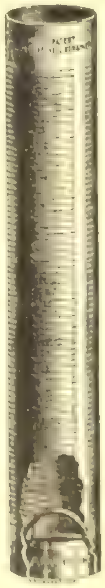

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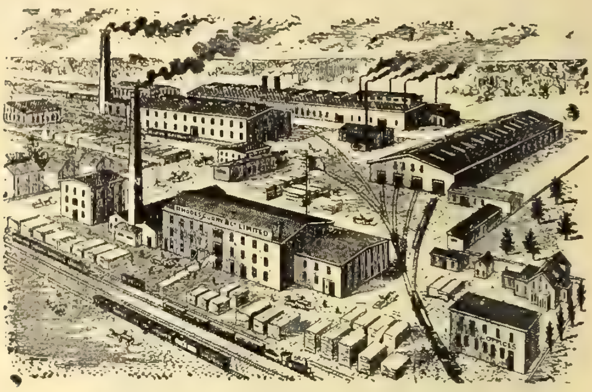

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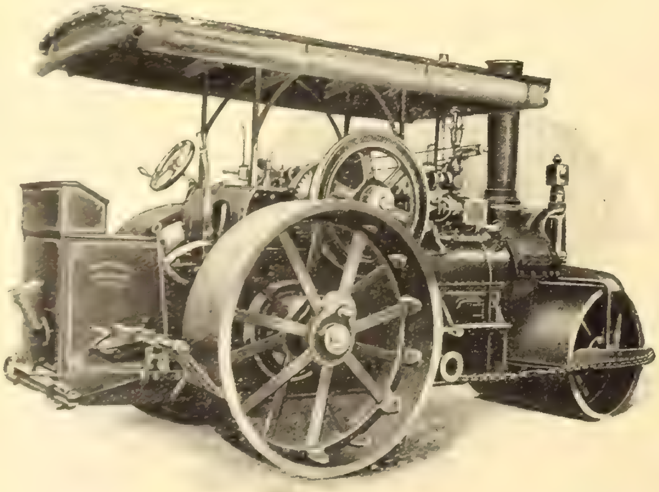

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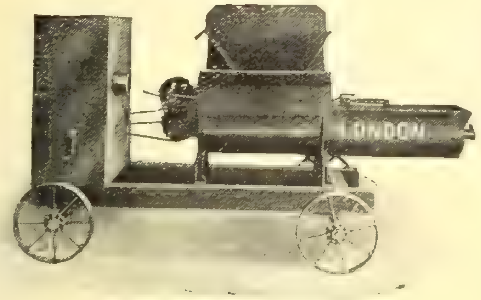

London Automatic Batch Mixer No. 1
Capacity 50 yards per 10 hours.

London Concrete Mixers

are made in all styles and sizes, meeting every requirement. **CONTRACTOR,** WE DO NOT DICTATE TO YOU AS TO WHAT STYLE OF MACHINE YOU SHOULD PURCHASE, we have EVERY STYLE AND SIZE of mixer required.

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These machines will be shipped anywhere on approval. WHY PAY A LARGE PRICE FOR CONCRETE MIXER WHEN YOU CAN PURCHASE AN AUTOMATIC MACHINE AT A MODERATE PRICE?

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We also Manufacture—

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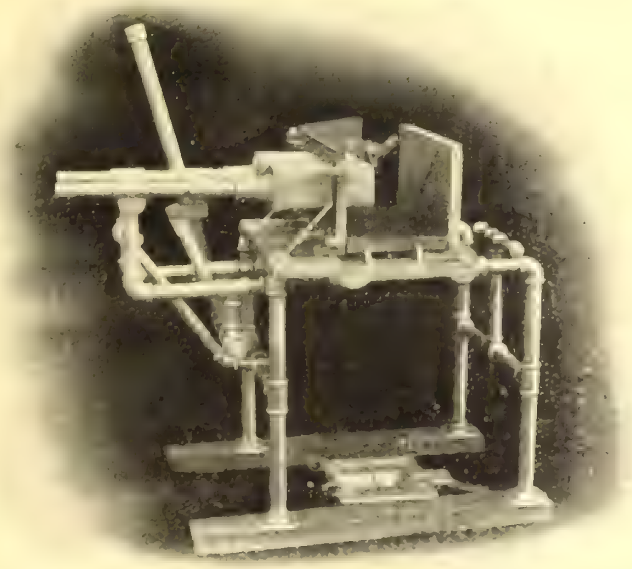

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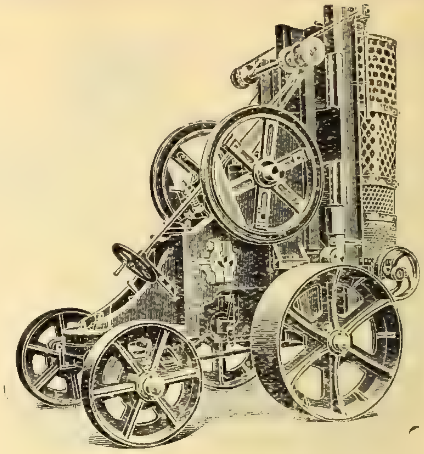

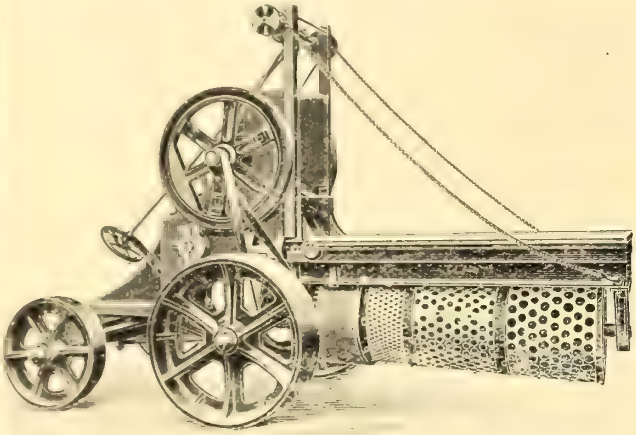

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Municipal Contracting at Montreal

The city of Montreal has obtained from the Quebec legislature a charter amendment empowering the city engineer to submit a figure on all permanent works to be undertaken. So far as the making of the estimate is concerned, the city engineer is to act, we are asked to believe, in the same manner as an outsider, inasmuch as he will have to take into consideration the extent of the work, its probable duration, the cost of labor, and other matters of fundamental interest to contractors. It is contended by the city that the practice will have the effect of making contractors more careful in their estimates; that it will result in keener competition and consequently better prices; and further, that it will stifle anything suggestive of a combine, as "each tenderer will be fully aware that he is entering into competition with at least one man who, by very reason of the position he occupies, is familiar with all the details of civic work."

The above contentions are somewhat illogical—to say the least. It is difficult to understand how the engineer and the contractor compete on equal terms when the former is bidding on work which he, himself, will supervise; which he will not have to guarantee, and in connection with which he will not have to make up any loss. Moreover, the city engineer does not have to take into account the assistance entailed in connection with the work. There are many other reasons that have been advanced by our readers in comparatively recent issues of this journal and we have no intention of re-opening the whole question of the relative efficiency and economy of day labor and contract work. There will always be advocates of day labor, but we must lodge an objection to such claims as are made above. In what way, for instance, will the fact of the city engineer's submitting a bid make a capable contractor "more careful?" If the contractor is sufficiently competent and well equipped to bid on important civic work, surely he is sufficiently sagacious to devote the greatest possible care to the preparation of his estimate. The really capable estimator can come within a small margin of what it will cost to complete a job satisfactorily and net him a working profit, and if the city engineer or any other public official likes to step in and submit a losing figure he is welcome to the contract and to the loss which it will entail. A capable man puts in a reasonable figure for good work, and an incompetent man puts in a low bid for what he is afterwards compelled to turn into cheap work.

As to "combines" they are largely mythical, conjured up in the minds of over-worked city officials and imaginative aldermen. It may be urged that Montreal's past history does not support this contention, but the statement holds good as a general principle. Combines do not work nowadays. Once in a while something of the kind is attempted, but invariably one of the party falls down or an outsider gets in—and that is the end of it. Generally speaking, contractors are clean, reliable, independent men who are doing the work for an honest figure and who want nobody's patronage. The contractor has had first rate experience and is stimulated to put the best into his work by the consideration that the greater his efficiency the better will be his reputation, and that the more expeditiously the work is carried to completion the more will it mean to his pocket. He, of all men, has the greatest stimulus to good work.

Lastly, in these competitive days, the contractor is assured of having "at least one good man up against him," whether the city engineer is competing or not. And as to familiarity with the details of civic work, that is essentially the contractor's business. In many cases it has cost him many years of study and a small fortune to acquire it.

A Noteworthy Suggestion

A member of the Alfred Rogers' staff conversing with a representative of this journal at the Cement Show the other day, made a suggestion that appeals to us to be worthy of more than passing consideration. It is that the Canadian Cement and Concrete Association erect a permanent building at the Exhibition grounds and that the convention and exhibition of the association be held concurrently with the National. The idea is one that should provide food for reflection. The financing of such a scheme would doubtless be somewhat of an undertaking, but once the industry become enthusiastic over the project, the means would readily be found. We believe that the ultimate returns would more than compensate for the outlay, for certain it is that it would raise the status of the association, stimulate public interest and result in greater co-operation on the part of the trade.

At the Scranton mine, Hibbin, Minn., all the steam and air pipes are contained within a concrete conduit extending from the power house to the shaft, a distance of 260 feet. The electric cables will also be carried in the same conduit. The conduit is made of concrete and is 4 ft. 6 in. wide at the bottom and about 6 ft. high. The walls are 6 ins. thick and arched at the top. The advantages of a conduit of this character are that the pipes are accessible at all times; they are out of the way and protected from the weather, which is not the case with pipes carried on surface trestles; the temperature of the conduit is such that condensation in steam pipes will be far less than when the pipes are exposed to the weather even though the are thoroughly boxed. Rings are anchored in the walls for supporting the pipes.

The Blumenthal Building at Montreal

Noteworthy Reinforced Concrete Structure Nearing Completion — Type of Construction Selected on Low Cost Basis — Designed according to Kahn System *

By R. E. W. Hagarty, B. A. Sc.

The only thoroughly fireproof building which could possibly have been selected for Montreal's new retail clothing store to be known as the Blumenthal Building, was the monolithic reinforced concrete structure now under course of erection at the corner of St. Catharine and Balmoral streets.

This new edifice, designed according to the Kahn system of reinforcement, will add undoubtedly another monument to the popularity and success of structural concrete in Canada's commercial metropolis.

Naturally, every merchant when considering the question of extending his warehouse, thinks first of the actual cost involved, and second, of the insurance rates, which as it happens vary in direct proportion to the chances of the entire stock being consumed by fire. However, this latter consideration is frequently not taken into account owing to over anxiety regarding minimum initial outlay. In other words, the fireproof qualities of a building too often remain at the mercy of what happens to be included in the "lowest tender." Nevertheless, in the case of the Blumenthal Building, although tenders were received from sources representing almost every type of modern building construction—structural steel, "the slow burning wood construction," terra cotta and steel with concrete fireproofing—yet, it is a somewhat noteworthy fact that the reinforced concrete tender secured the contract on a purely low cost basis.

The building has a frontage on St. Catharine street of 86 feet and measures 108 feet in the direction of Balmoral street. Thus the floor plan is rendered rectangular. Since there is no light-court opening in the centre, the building will have a gross area of 9,288 square feet for the entire seven floors of its height. Hence the total floor area will be 74,304 square feet.

A section taken longitudinally through the structure shows each floor, except the first, at a uniform elevation. Owing to a grade in St. Catharine street, the elevation of the main entrance vestibule, measuring one panel across by two panels deep, is placed 1 ft. 6 in. above the main floor level, while at the rear of the building is situated a small mezzanine floor.

From the basement to the ground floor measures 17 ft. 6 in., and from the ground floor to the second floor 19 ft. All the remaining storey heights are 13 ft., giving a total height of 101 ft. 6 in. to the level of the top of the finished roof. Rising above this elevation is a 7 ft. parapet wall, making an overall height of 108 ft. 6 in.

Elevator Service.

An efficient elevator service, consisting of one freight and one passenger car has been provided. With this ararngement there is an elevator ratio of approximately 743 considering the gross floor area. This compares favorably with modern building practice. The freight car is located at the rear corner of the building on the Balmoral street side, and will operate from the basement to the seventh floor inclusive. The passenger car will operate between the same limits on the opposite side of the building about half way between front and rear.

General Specifications.

The following is an extract from the general specifications under which all Kahn System buildings are constructed:

1. Cement.

1. All cement furnished for this work is subject to inspection and tests as hereinafter specified.

2. Inspection and tests shall be conducted by laboratory selected by architect and at the cost and expense of the contractor.

3. All inspection and sampling shall be made by the laboratory at the point of manufacture sending samples to its laboratory for tests, and only cement that has been previously accepted will be allowed on the work.

4. The acceptance or rejection of cement used under this specification shall be based on the following requirements:

(a) Fineness of grinding.
(b) Time of setting.
(c) Specific gravity.
(d) Constancy of volume.
(e) Chemical composition.
(f) Strength—cohesive and adhesive.
(g) Microscopic test.

(a) **Fineness of Grinding.**—After being gently shaken for five minutes, the cement must not leave more than eight per cent., residue on a sieve having between ninety-six and one hundred meshes per linear inch, the size of the wire being 0.0045 inches; or after being gently shaken for ten minutes must not leave a residue of over 24 per cent. on a sieve having between 192 and 200 meshes to the linear inch; the size of wire being 0.00235 inches.

(b) **Time of Setting**—On being mixed for three minutes on a non-absorbent surface with the proper percentage of water to produce normal consistency, the paste shall not develop initial set under twenty-five minutes or final set under four hours, or over ten hours. The paste to be kept in a moist atmosphere at about sixty-five degrees Fahr. during the test, and results taken with Vicat apparatus.

(c) **Specific Gravity**—The specific gravity on fresh cement must not be less than 3.15 or more than 3.25. On seasoned material the specific gravity must not be less than 3.08.

(d) **Constancy of Volume**—A pat about three inches in diameter, one-quarter inch thick at center and tapering to a thin edge made from paste mixed for three minutes on a non-absorbent surface with proper percentage of water to produce normal consistency, shall be placed on a glass plate and allowed to set in moist closet at a temperature of 65 deg. F. for twenty-four hours; it shall then be placed in cold water, which shall be raised to boiling point and kept boiling for three hours. The pat after boiling shall show no signs of cracking, warping or similar indications of disintegration.

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* The Blumenthal Building was designed by Mr. Hagarty for the Trussed Concrete Steel Company of Canada, Limited.—Ed.

(e) **Chemical composition**—Shall be within the following limits:

Silica, 21 to 24 per cent.
Alumina, 5 to 10 per cent.
Iron oxide, 2 to 4 per cent.
Lime, 60 to 65 per cent.
Magnesia, not more than 3 per cent.
Sulphuric anhydride, not more than 1.75 per cent.
Alkalies, not more than 3 per cent.

(f) **Strength**—Cohesive: The cement shall be mixed for not less than three minutes on a non-absorbent surface with water to produce a paste of normal consistency; it shall then be pressed into oiled moulds with the fingers, but in no case rammed. The tests specimens (briquettes) shall be placed in moist closet maintained at a temperature of 65 deg. F. for twenty-four hours, after which the moulds shall be removed and the briquettes placed in cold water until tested. The average of five briquettes broken at each period must exceed the following values:

2 days after gauging—275 pounds per sq. in.
4 days after gauging—400 pounds per sq. in
7days after gauging—500 pounds per sq. in.
28 days after gauging—600 pounds per sq. in.

There must be a rise in strength of at least fifty pounds between each period; the stress to be applied at the rate of 100 pounds per ten seconds.

2. Sand.

The sand shall consist of grains of any moderately hard rock that is perfectly sound. Any sand showing signs of disintegration shall be unconditionally rejected.

The sand shall be well graded from coarse to fine.

Any sand containing over 5 per cent. of loam or clay, or foreign matter of any kind, will be rejected.

3. Broken Stone or Gravel.

The aggregate shall be composed of broken stone or screened gravel. The broken stone shall be of a hard close- grained quality, free from dust and crushed so that its largest dimension shall pass through a ring one inch in diameter. Gravel shall be free from dirt and sand and shall range in size from that of a pea to an inch. Disintegrated stone or broken stone containing mica shall be rejected.

4. Proportions.

All concrete for slabs and beams shall be proportioned of one part Portland cement, two parts sand and four parts broken stone or screened gravel.

All concrete for columns shall be proportioned of one part Portland cement, one and one-half parts sand, and three broken stone or gravel.

Gravel which has not been screened may be used as follows:

For slabs and beams and reinforced footings in proportion of one part cement to four parts unscreened gravel.

For column, 1 part cement to 3 parts unscreened gravel.

For plain footings and mass concrete generally, 1 part cement to 6 parts unscreened gravel.

If the gravel is used without screening it shall be examined from time to time, and in case its composition is not such as to give the required proportions, sand or broken stone shall be added as may be necessary.

5. Reinforcing Steel.

Steel used shall be medium open hearth steel to be rolled from new stock and to meet the manufacturer's standard specifications.

Ultimate strength 60,000 to 70,000 lbs. per sq. inch.

Elastic limit not less than half the ultimate strength.

Minimum elongation twenty (20) per cent.

Bending test 180 degrees to a diameter equal to thickness of piece tested without fracture on outside of bent proportion.

All steel shall be free from paint, oil or heavy rust or scale.

6. Reinforcement for Solid Slabs.

For solid concrete slabs, the reinforcement shall be a steel fabric made of open hearth steel and provided in flat sheets. The main tension members shall be at right angles to the supports, have a maximum spacing of 8 inches and shall be accurately spaced by rigidly attached cross members, preferably made from same sheet of metal. The cross members shall not be spaced farther apart than the spacing of the main tension members.

Blumenthal Building, Montreal, when Completed.

7. Reinforcement for Beams.

For joists, beams and girders no reinforcement shall be considered that does not provide for shearing stresses as well as direct tension. Shear members shall be inclined at an angle of 45 degrees, pointing up and towards the supports and shall be rigidly connected to the main tension member by shearing up its flanges. There shall be sufficient shear reinforcement so that the concrete will be obliged to resist only direct tension and shear up to 50 pounds per square inch.

8. Minimum Protection.

The minimum protection for reinforcing steel which shall be taken as the distance from the surface of the steel bar to the nearest concrete surface shall be:

(a) For slabs—[illegible] inch
(b) For beams, girders and columns—1½ inches.

Steel shall be placed in exact accordance with detail drawings.

9. Basis of Calculation.

In the calculation of stresses the following assumptions shall be made:

Modulus of elasticity of steel, Es equals 30,000,000.

Modulus of elasticity of concrete, Ec equals 2,000,000.

Whence $\frac{Es}{Ec}$ equals m equals 15

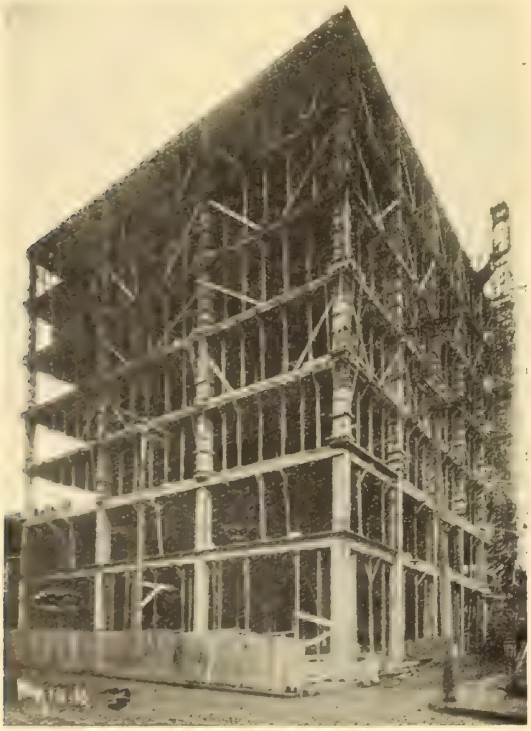
The value of m given above remains constant at working stresses.

A plane section before bending remains a plane section after bending; that is, the stress in any fibre is directly proportional to its distance from the neutral axis.

The tensile strength of concrete shall be neglected.

10. Allowable Stresses.

The following maximum stresses based on figuring full live and dead loads shall be used in the design of reinforced concrete work:



Blumenthal Buildings under Construction

Steel in tension equals 16,000 lbs. per square inch.

The extreme fibre stress in concrete in compression in slabs, beams and girders equals 750 lbs. per sq. in.

Concrete in shear equals 50 lbs. per square inch.

The minimum longitudinal reinforcement in any column regardless of the load carried by same, shall be one per cent. of the cross sectional area.

For columns reinforced with longitudinal bars tied at intervals of not less than the diameter of the column, the safe load shall be computed as follows:

Safe load (in pounds) equals 500 Ac plus 7,500 As.

Ac equals net cross sectional area of column in square inches.

A s equals cross sectional area of longitudinal reinforcement in square inches.

For columns reinforced with longitudinal steel and with spirally wound hooping the safe load shall be computed as follows:

Safe load = fc Ac + mfc (As + 2.4 A's).

Where fc equals allowable stress on concrete in compression, to be taken at 750 lbs. per square inch.

Ac equals net area of concrete enclosed in hooping.

As equals cross sectional area of longitudinal reinforcement.

A's equals cross sectional area of imaginary vertical rods having same quantity of steel as the hooping per lineal foot of column.

For wall columns the above safe carrying capacities shall be reduced 20 per cent.; for corner columns reduced 30 per cent.

The stresses allowed above shall be used only in the case where the unsupported length of the column is not greater than 15 times the least diameter. Where the length exceeds this limit the allowable stress shall be reduced according to the standard formulas.

Where columns are subjected to loads of known eccentricity the combined stress in the extreme fibre due to direct compression and bending moment shall not exceed that allowed in slabs and beams.

11. Bending Moment Formulae.

1-12 Wl for both continuous ends.

1-10 Wl for one continuous end.

1-8 Wl for free ends.

Top reinforcement over supports 50 per cent. of required steel area at centre.

12. T-Beams.

If the slabs, beams and girders in the floor construction are poured in one continuous operation the width of the adjacent floor slab on each side of beam or girder that may be considered to act as the compression flange of same shall not exceed twice the width of the beam or girder or five times the thickness of the slab.

Structural Design of the Blumenthal Building.

Speaking generally, the Blumenthal building has been designed according to a specified floor load of 125 pounds per square foot, although certain concessions were made in one or two cases to meet architectural requirements, reducing the load slightly below this amount.

A four-inch floor slab reinforced with No. 5 Kahn rib metal is used throughout except on the roof, where No. 8 rib metal is sufficient owing to the reduction in the live load to 45 pounds per square inch.

The main beams of the building measure 6 in. x 21 in. with header beams 12 in. x 23 in.

Tee action was allowed in the design wherever possible, although it was not considered expedient to permit the general use of compression steel; hence a few beams were necessarily increased in width where openings due to the elevator shaft deprived the designer of slab action.

In one case it became necessary to use a small amount of compression steel in order to limit the maximum depth to 23 inches. However, if it had not been considered good practice to adhere rigidly to the specifications (invariably of an arbitrary nature) one might have safely depended upon the compression in the concrete even in the case mentioned. Hence, the use of compression steel was merely a safeguard and did not strictly form a portion of the design proper, and may not, therefore, be cited as a precedent in favor of the general adoption of such a procedure.

The beams of the outside panels on the ground floor frame into the top of a retaining wall; but, in the upper storeys the skeleton construction is used. The 12 in. brick curtain wall is carried by 12 in. x 21 in.

and 12 in. x 23 in. beams framing into the columns. These also carry the floor beams in all storeys above the first. The elevator beams at the roof were designed to carry the hoist beams by allowing 800 pounds per square foot for the shaft openings and assuming this amount concentrated on the diagonal two-thirde of the way from front to back of the elevator.

Kahn trussed bars of size varying from ¾-in. x 2-in. to 2-in. x 3½-in. form the main portion of the beam reinforcement. Where concentrated loads came at or near the center of the span, "Center Sheared Kahn Bars" were used, although in the ordinary case it was more economical to allow the Kahn System Cup Bars of two-thirds the span length to accommodate part of the required steel area, provided the prongs of the ordinary trussed bar were sufficient to assist the concrete in resisting the abutment shear.

Columns, Foundations and Retaining Walls.

The columns, which are 17 ft. 4 in. center to center, are arranged in four rows 21 ft. 10 in. apart running longitudinally through the building.

The "hooped" design has been used throughout with the exception of a number of the roof columns.

The basement columns are built square and vary in size from 26 in. to 30 in. outside dimension (the 30 in. size being used only on two of the four columns, which support the roof tank). The size decreases 2 in. per floor with the minimum of 14 in. at the roof. The reinforcement consists of ¾-in., ⅞-in., 1-in. and 1⅛-in. round rods with ⅜-in. wire hooping with 1½-in. pitch. The interior columns above the ground floor are built octagonal, giving an apparent reduction in the actual size.

Four of the columns are designed each for an extra load of 50,000 pounds, for the support of a water tank on the roof. Around the outside of the building is located a retaining wall extending over 16 feet below the ground floor level to suitable foundation. The reinforcement consists of ⅝-in. Kahn System Cup Bars.

The columns are supported on open caissons sunken to hard pan and filled with concrete to a depth varying from 40 to 47 feet. In sinking the caissons it was found expedient to use Carnegie sheet steel piling, all of which was successfully removed under the direction of Mr. Herbert P. Beck, C.E., general superintendent for the contractors.

The architects for the building are Messrs. Mitchell and Ogilvy, Montreal. The architectural features of the Blumenthal building will be fully as elaborate as those of other reinforced concrete structures which have been erected in Montreal, notably the Jacobs Building, Canada's largest concrete building, recently completed. The contract was awarded to T. J. Loomis & Sons, Montreal. The steel reinforcement and structural design was supplied by the Trussed Concrete Steel Company, Walkerville, Ontario.

An Ancient Specimen of Concrete

The oldest piece of cement in the world, so far as is known, was shown by Alfred Hopkins, the New York architect, at the Seventh Annual Convention of the National Association of Cement Users in the Concert Hall of Madison Square Garden. Mr. Hopkins is somewhat of an antiquarian. He spent last summer in prowling about the ancient Greek and Roman ruins in Sicily, where many of the great works of the ancients remain in a wonderful state of preservation. Among the places he visited was Salunto one of the oldest Roman strongholds on the island in the pre-Christian era. There he found huge blocks of stone still bound together by a cement which has defied the wind and weather of more than two thousand years. In construction he found the cement on analysis to be wonderfully like that of to-day. A natural binding material had been used, but instead of the trap rock of to-day he found that the ancients had used a black rock known as Travertine, a popular building rock of the time and a white rock known today as Selcite. In other sections of the cement broken tiles and marble had been utilized. The ruins in which he found this example of building materials used by the old Romans dates from at least 200 B.C., and may be even older.

City Engineer Childs, of Calgary, has plans for extensive sewer work in that city, and a by-law will shortly be submitted to raise $309,800 in this connection. Calgary will posess 75 miles of sewers by the end of 1911.

The value of the building permits issued at Toronto during February, 1911, exceeds that of February, 1910, by nearly $100,000. The totals for the first two months of the respective years, however, are $1,428,170 and $1,542,528.

Calgary, Alta., is on the verge of a building boom. The returns for February were $333,660, compared with $169,800 last year. The totals for the two months of 1911 are $629,700, as against $276,300 for January and February of 1910.

Judgment has been given against the Vogel Company of Canada, Limited, in the action instituted against them by Messrs. Boivin, Wilson & Co., Montreal in connection with the collapse of a large water tank which occurred at the building of the latter company in April, 1907, causing considerable damage to the stock and killing a girl. The amount of judgment was $9,500.

A new $1,000 building is projected for Vancouver by Mr. J. W. Weart of that city. The building will be known as the St. Regis and will combine a theatre, hotel and offices. It will be ten storeys high.

In the year 1909, 111,869 barrels of cement were imported into New Zealand at an approximate value of $235,000. This is an opportunity for Canadian manufacturers. Canada has a preference of 2s. a barrel as against foreign countries.

Reinforced concrete construction being monolithic in nature, there are no joints, and each member is continuous through all other members. Any shock or jar will be distributed with no damage to any part. As a common everyday illustration there is no better example than the use of concrete structures for railroad bridges and viaducts under heavy traffic.—D. V. Moore.

Despite the prevalence of severe weather at Prince Rupert the grading of the streets and the construction of sewers has been pushed with great energy. The difficulty of street making is almost beyond belief. Often holes 40 feet in depth have to be filled, while cliffs 100 feet high have to be dynamited. A big influx of population is looked for this spring.

Cement Show and Convention at Toronto

Evidences of Progress in every Department of the Industry — An Instructive Address from the President — Details of Successful Meeting

The third annual convention and exhibition of the Canadian Cement and Concrete Association were held in Toronto last week. The show was opened on the evening of Monday, March 6th, by Hon. G. P. Graham, Minister of Railways and Canals, who was received by Professor Gillespie, president of the association. A raised platform had been erected for Mr. Graham in the tastefully decorated booth of Alfred Rogers, Limited. There was an excellent attendance on the opening night, and the St. Lawrence Arena, where the show was held, presented quite a festive appearance, the national colors exhibited contributing greatly to the effectiveness of the decorations. Hon. Mr. Graham, who was received with much enthusiasm, reviewed briefly the progress of the industry in recent years. It was but a decade, he said, since the annual output amounted to only 400,000 tons, whereas last year it totalled nearly 5,000,000. Neither had quality been sacrificed to quantity. In his opinion Canadian cement was second to none. The speaker referred to the inroads made by cement in the department of which he is head. There, he said, it was recognized as practically the only material for most of their most important work. The government was now considering extensive harbor construction at Halifax in which cement would be employed throughout. Cement was becoming indispensable in every great work. In the construction of the Quebec bridge 5,000 cubic feet of cement would be used in each caisson. During 1911 the Dominion government itself would be a customer for 280,000 barrels. Mr. Graham referred to the making of cement railway ties as one of the most interesting of recent innovations with this material. Cement, indeed, was being put to so many novel uses that the speaker suggested humorously the possibility of some enterprising breakfast food manufacturer bringing out a patent preparation of which cement was the chief ingredient. The band of the 48th Highlanders, which was in attendance, rendered a capital programme during the evening.

Professer Gillespie, who was re-elected President of the Canadian Cement and Concrete Association.

The convention was opened on the afternoon of Tuesday, March 7th, by Professor Gillespie, who spoke as follows:

Professor Gillespie's Address

Failures and the Lessons Which They Teach.

It is a truism often repeated that the public has a short memory. The lessons to be derived from great disasters are soon forgotten, except by a very small number. The fatal Iroquois Theatre and Collinwood school disasters of a few years ago, so costly in child life and so much in the public mind for short intervals, showed the necessity of safeguarding the occupants of public buildings. For a time our civic authorities were active in having places of public entertainment carefully inspected. Much was heard for a season about fireproof curtains, accessible exits, fire drill and fireproof schools, but soon the public relapsed into its old ruts. Inspection became less searching and the authorities more forgetful and the public continues to run daily the same risks that the victims of these disasters ran. It sends its children to the same schools and attends itself the same places of public worship or entertainment and only becomes conscious as to the chances it is taking when some other horrible calamity occurs. Truly, the public has a short memory.

It is chiefly because humans are humans and not machines that we continue to take chances. A machine can be constructed to do a given thing in a specified way an endless number of times. Whether its work be punching or drilling or cutting, it does it with machine-like precision. It never tires, never grows careless and is never actuated with a spasm of over-zealous indolence. It is never tempted to scamp its work. It is never influenced by the desire to make excessive profits and never knows the flattery of the multitude or the sting of adverse criticism. It never forgets, never flatters, never tempts, never cajoles, never bluffs and never pleads. But men are differently constituted. They possess the human traits. They are influenced by example, possess passions, and emotions, cherish hatred, remember injuries and forget the lessons which great crises in their experience ought to impress on them. The attention of engineers, architects, builders and building departments has been called to the lessons which are taught by the failures of structures designed and erected by them or under their supervision. It is not that the field is a new one that this paper is devoted to so hackneyed a topic, but to emphasize once again, firstly, those elements which have contributed to failures, and secondly, those corrective or precautionary measures which will tend to prevent their re-occurrence.

Especially in the use of reinforced concrete has the general reader's attention during the past five years been called to a rather large list of failures, all of them more or less serious, and not a few of them having fatal results. Reinforced concrete has been comparatively new in the building art and in its fabrication is very different from other materials with which the constructor is familiar. Unlike steel or wood, its strength increases with age. It is poured into forms, at which time it is plastic, and has to be sustained until it acquires sufficient strength to support itself. It consists of two materials, not one, and since the disposition of these, with respect to each other vitally affects the strength of the product, exercise for great care in this placing is necessary. More perhaps than of any other building material is this true—it possesses great capacity for injury in the making and placing. Following are cited a number of failures of reinforced concrete structures which during the past twelve months or so have occurred, and reference to which in the engineering press has come to the writer's notice. They represent typical cases and an examination of the list will enable us to classify the causes under a few general heads.

Typical Cases of Failure.

The comparatively recent anounncement that the great dam across the Colorado River at Austin, Texas, is to be rebuilt has served to recall its failure over a decade ago. It will be remembered that that failure was announced to the world at first as a serious reflection upon the engineering profession because some hydraulic engineers of eminence had been connected with the work. Subsequently, however, when the whole history had been investigated, it was found that the authority of the engineers had been interfered with to such an extent by the city officials in control, that their responsibility had been practically nullified. Indeed, one prominent engineer had resigned rather than have his name further connected with a work over which he had no control.

On February 28, 1910, a reinforced concrete arch of three-span over the Flat Rock river at Edinburgh, Ind., collapsed during an unusually heavy flood. The design had been furnished by a well-known bridge company, but the bridge commissioners, in their desire to economize, and with a wisdom commensurate with their experience in such matters, decided to omit the piling underneath the abutments and to carry them instead to a somewhat greater depth. And so the bridge was built. The materials supplied and the workmanship throughout seemed to be excellent, but in the season of heavy floods, the piers were undermined by scouring and the structure collapsed. There does not appear to be any other cause of failure than the insufficiently supported piers, and the responsibility, of course, must rest on those who ordered the modification of the original plan.

A concrete dam at Fertile, Minn., was washed out by floods early in April, 1910. The trouble is attributed to the fact that the foundations were not laid sufficiently deep to prevent scouring and undermining, and failure ultimately ensued.

The partial failure of the Baylesc reinforced concrete dam at Austin, Pa., in January, 1910, exemplifies a trouble of a slightly different character. The dam was completed in December, 1909, at a cost of upwards of $70,000. On completion, it was observed that there was one small crack 1/16 in. wide, extending from the top of the dam to the ground level. Subsequently, others, similar in appearance, developed, and during a heavy freshet on January 23, 1910, a section of the dam, between vertical cracks, under the thrust of the impinging water, slid forward some 18 inches. This movement covered a period of some eight hours and then stopped. Investigation disclosed the information that the failure was due primarily to the fact that the dam was founded upon a bed rock, the successive strata of which were separated by layers of shale or clay. The impounded water, having worked itself under the foundations, had softened the clay with the result that the upper stratum carrying a portion of the dam had moved forward on the lower. It was stated that the weakness of the concrete was doubtless due to the fact that much of it had been hurriedly placed, part of it in freezing weather. The anchor bolts, which had been grouted into the foundation rock, had moved outward with the rock into which they were anchored.

On April 7, 1910, the collapse of a concrete roof under construction at the new car barn of the Shore Line Electric Road at Saybrook, Conn., took place, and resulted in the death of one man and the injury of two others. The roof was a 4 in. slab of reinforced concrete on girders about 8 ft. on centres and of 37 ft. span. The last work had been completed about ten days and the forms were being removed. It was believed that the premature removal of the forms and the excessive loading of the green roof slab with roofing material, were the joint causes of the accident.

On July 13, 1910, one of the columns of the concrete groined arch roof to the filter chambers in course of construction at Owen Sound, Ont., collapsed while the centreing beneath was being removed. Two men were quite seriously injured. The accident apparently was due primarily to the early removal of forms, combined with the fact that the 18 in. x 16 in. columns on two sides of the square roof of the arch were quite incapable in themselves of resisting the arch thrust. The forms were removed in only four days after pouring, notwithstanding the fact that seven days was the minimum specified time for removal.

The upper part of a reinforced concrete chimney under construction at the plant of the American Woollen Company, South Royalston, Mass., collapsed on April 9, 1910, causing the death of two men. The chimney was to have been 105 feet high with an inside diameter of 4 feet and an outside diameter of 4 ft. 8 in. at the bottom, and with wall varying in thickness from 8 in. at the bottom to 4 in. at the top. The forms used in construction were in two sections, each 3½ feet deep. The procedure was to fill the upper form, then to loosen the lower and set it above the upper for filling. This took one day. Next morning the form in the lower section was loosened and it was placed on top and filled. Thus, the concrete in any 3½ ft. vertical section had less than 24 hours in which to set before its side-supporting forms were removed. The accident occurred when a height of about 70 feet had been reached, the section last uncovered, then only twenty hours old, caving in and carrying the workmen to the ground with it. It is reported that the temperature the day before the break had taken a sudden drop, but it was not at any time below freezing. The failure was undoubtedly due to loading a very green concrete before it had acquired sufficient resisting power, as the materials were good and the design and execution satisfactory.

A reinforced concrete grain elevator of typical design failed under a normal pressure of grain at Springfield, Ohio, on October 24, 1910. As has been rather common in elevator construction where a battery of cylindrical units has been constructed, the unused spaces, external to the cells, but lying within the tangent walls, had been utilized as auxiliary bins. No one saw the beginning of the collapse so that its exact behaviour cannot be stated, but from the appearance afterwards it was evident that the lower section of the wall where the pressure was greatest, was forced out under the pressure of the wheat. This portion sheared off clear at the line where the straight wall connected with the circular wall of the larger bin. The weak point in the structure was that the horizontal rods in the straight wall were not connected to those in the circular, nor were they tied back for any distance into the concrete of the circular walls. It was stated that the plans showed the rods in the straight walls securely fastened into the circular lines and that the failure to so fasten them was due to the negligence of the foreman.

On November 22, 1910, a four-storey reinforced concrete building being erected for the Henke Furniture Company, Cleveland, Ohio, suddenly collapsed, throwing one of the walls over a two-storey frame building next door and so crushing the structure as to cause the death of four of its occupants and the serious injury of seven others. It was of reinforced concrete column and girder construction with hollow tile and concrete floor system, and brick curtain walls varying in thickness from 21 in. at the basement to 13 in at top floor. A commission of inquiry was Immediately appointed on which were representatives of the Builders' Exchange, the Cleveland Engineering Society and the Cleveland

Chapter of American Institute of Architects. This committee was empowered to take evidence and to consult every available source of information that might explain the cause of failure. After the wreck had been carefully examined, the design checked over and the witnesses examined, the finding was announced. The failure, it stated, was due primarily to the premature removal of forms in the third storey. It fixed the responsibility on the architects, the contractor, the owner and the Department of Buildings for the city of Cleveland. The architects were adjudged responsible in that they did not give sufficient consideration to the removal of forms, in that they did not give sufficient attention to the materials and in that they did not give adequate supervision to the work of construction. The contractor was adjudged culpable in that he employed foremen who were entirely ignorant of the intent of plans and specifications or of the nature of the materials they were handling. In consequence, the sand was inferior, the forms were removed prematurely, and that regardless of weather conditions, the green concrete was regularly overstrained, the members were not of the sizes called for in the plans, the concrete composing them was open and porous and sawdust and shavings were found in the bases of columns. In addition, it developed that less cement had been delivered to the building than would have been necessary to construct it had it been built as planned.

The owner was deemed responsible in that he had not employed a special concrete inspector in the work as required by the building regulation.

The Department of Buildings was held responsible in that it had ignored the requirements of that portion of the Building Code which makes it necessary that the owner employ a special reinforced concrete inspector. It thus appears that the Building Department rather than the Building Code was at fault.

Causes of Failure.

I have chosen to classify the cause of failure in the above cited cases as follows:

(1) Interference with a suitable design by those in authority, but not possessing a knowledge of engineering practice.

(2) Defective design.

(3) Inferior materials.

(4) Ignorant or wilful disregard of specifications and plans.

The first of these is unfortunately of too common occurrence. In all human probability the Austin dam and the Edinburgh arch would be standing to-day but for the intervention of the "cock-sure aggressive" individual who, when clothed with a little brief authority becomes a paragon of wisdom on everything under high heaven. This type is found frequently in our municipal councils, and it is to be regretted that engineers of wide experience and good judgment sometimes permit themselves to be dominated by them. An engineer's judgment may be in error, but is it not more likely to be productive of good results if it be corrected through consultation with other engineers of equally good standing than if it be reversed by men entirely untrained in the problems of design and construction.

Fortunately, the day of unsafe design in reinforced conforced concrete like the design in wood or steel has been reduced or is being reduced to a standard based on the proportion and strength of materials which constitute it. There is, therefore, no reason to-day why the average practising engineer should not acquaint himself with concrete designing, so that, at least, he can finish his plans with some such detail as he does those for his structures in steel. He may, if he prefers, leave the details to his contractor, who like the contractor for steel, can make them according to the standards of his practise. He must exert every care in informing himself as to the character of the materials he must employ and of the foundation upon which he proposes to erect his structure. The dams at Fertile, Minn., and at Austin, Pa., furnish illustrations where disaster might have been averted by a careful examination of the underlying strata prior to construction. The designer must recognize, too, that the safety of his design depends upon the constructor as well as upon himself, since concrete construction is not fixed as is that in steel. An editorial in the Engineering News, speaking of this phase of a designer's responsibility, asserts that "the design cannot be sent from the drawing table with perfect confidence in its precise reproduction in the structure. It is the joint product of the man in the office and the man in the field, and any design which fails to recognize this is a poor one no matter how nearly it may conform to accepted standards. No engineer who is not prepared to supervise the construction of a reinforced concrete structure is justified in designing that structure as closely to the safety limits as he is when the construction is to be under his eye."

The prevention of the utilization of inferior material is the work of the engineer, the architect and the inspector. No reinforced concrete work of any magnitude should be constructed without a capable conscientious inspector. The Henke building suffered from inferior material as it did from almost every other malady to which reinforced concrete is heir. The remedy for this is vigilant, constant inspection. Failures resulting from the premature removal of forms could invariably have been prevented by the exercise of intelligence and a little precaution. The Henke building disaster, the Owen Sound filtration plant accident, the car-barn roof failure at Saybrook, Conn., and the chimney collapse at South Royalston, Mass., were all preventable if careful examination had been made before stressing the concrete, which, possibly, due to temperature conditions had not yet acquired its preliminary strength. The failure of the grain elevator at Springfield, Ohio, was due to the ignorance of a foreman. Any foreman who appreciated the proportions of the materials he was handling would not make the blunder that was made.

The remedy for these evils is the employment of the experienced, intelligent, painstaking inspector. He sees that the forms are cleaned before the concrete is poured, that the ingredients are correctly proportioned, that the steel is properly placed and in correct amount, that the members are of dimensions called for by the plans, and that the forms are not removed until the material has acquired sufficient strength to be self-sustaining. The capable inspector is essential to safe construction.

Instructive Addresses.

Mr. R. F. Havlick, of the engineering department of the Ideal Concrete Machinery Company, South Bend, Ind., gave a comprehensive address on the subject of concrete blocks, and afterwards showed some fifty excellent lantern slides illustrative of the possibilities of this material. Following this, Mr. H. P. Bowes, superintendent of the Warren Bituminous Paving Company, Toronto, gave a paper entitled, "Grading Stone Aggregate," also illustrated by lantern slides. A brief discussion followed, in which Professor Gillespie, C. R. Young and others took part. Mr. Bowes' paper will be found in another column.

At the evening session the members were treated to an interesting description of the methods of manufacture of Portland cement, by Mr. W. M. Kinney, assisting inspecting engineer for the Universal Portland Cement Company, Pittsburg, Pa. The remainder of the evening was taken up with an instructive paper by Mr. C. W. Noble, Toronto, on the "Prevention of Corrosion in Metal Lath," and an address by Mr. J. M. Carrere, Blanc Stainless Cement Company, Allentown, Pa. Mr. Carrere's subject was "The White and the Gray."

On Wednesday, March 8th, Mr. Richard L. Humphrey, President of the National Association of Cement Users, and Director of the United States Structural Materials Testing Laboratories, Pittsburg, Pa., spoke at some length on the progress of cement construction in the United States and the development of the National Association. At this session an instructive paper was also given by Mr. E. A. James, editor of the "Canadian Engineer." Some discussion ensued, Messrs. Humphrey and J. A. Jamieson taking part. Mr. C. S. Hertzberg, engineer of the Trussed Concrete Steel Company, Walkerville, Ont., gave a paper entitled, "A Few Points on Reinforced Concrete Design." This was discussed by Messrs. G. Kahn and C. R. Young.

In the evening an enjoyable smoker was held at the St. Charles Hotel. An excellent musical programme was provided, also refreshments, and in addition Messrs. R. L. Humphrey and J. A. Jamieson, among others, gave interesting addresses. The former spoke forcibly on the necessity for co-operation. He urged that the association endeavor to obtain standard specifications in Canada for concrete products, and that the members of the association work more closely together for the common good of the industry. As an instance of what might be done in this way he cited the attainments of the N. C. U. A. These had only been accomplished after considerable sacrifice and much hard work.

The committee on specifications met on Thursday morning, March 9th, and the specifications as proposed were adopted. These will be given in a later issue.

At the annual meeting of members at the afternoon session, the following officers were elected: Honorary president, Hon. G. P. Graham, Ottawa; president, Professor Gillespie, Toronto; vice-president, Kennedy Stinson, Montreal; secretary-treasurer, Wm. Snaith, Toronto; directors, T. L. Dates, Owen Sound; W. H. Ford, Montreal; Ivan S. Macdonald, Toronto; James Pearson, Toronto; C. F. Pulfer, London; D. C. Raymond, Toronto; J. A. Jamieson, Montreal; C. C. Lapierre, Montreal; Alfred Rogers, Toronto; C. R. Young, Toronto; Gustave Kahn, Walkerville; George Benoit.

A joint meeting with the Engineers' Club of Toronto, was held on Thursday evening, March 9th. The members of the Cement Association were received on behalf of the club by Dean Galbraith, who spoke in his usual cordial manner. At this meeting, which marked the close of the association's convention, Mr. Humphrey gave an excellent address on building by-laws and reinforced concrete (illustrated by lantern slides), and Mr. Frank Barber, of Messrs. Barber & Young, bridge and structural engineers, Toronto, a paper entitled, "The Adaptation of Concrete for Long Span Bridges." Mr. J. A. Jamieson, Montreal, also spoke on the subject of "Specifications."

A description of the various exhibits will be published in our next issue.

Dominion Bridge Company at Winnipeg

The Dominion Company, Limited, of Montreal, have recently built a considerable extension to their Winnipeg works. Since 1906 they have had in Winnipeg a small shop, of about 4,000 tons capacity per annum, in which was fabricated some of the simpler structural steel work required in the west. The drawing and engineering work, however, was all done at the head office in Lachine. In 1910 it was seen that this method would not supply the rapidly increasing demand for steel in western Canada. The shop, therefore, was greatly enlarged and is now fully equipped to turn out about 18,000 tons per annum. A complete engineering and draughting office is being established in Winnipeg, and it is intended that this plant will take care of the western work. The high class buildings which are now being erected in all the cities in the Canadian West call for a great amount of steel work, and the short building season necessitates a quick delivery of material for which this company has always been noted. In its three plants at Lachine, Winnipeg and Toronto the Dominion Bridge Company now has an annual capacity of over 80,000 tons of bridge and structural steel. Mr. George E. Bell, late of the Montreal contracting office of the company, has recently been appointed local manager in Winnipeg.

Terra-cotta Fireproofing

Porus terra cotta is coming into greatly increased favor for the fireproofing of important buildings, and inasmuch as there are not many firms making a specialty of this kind of work, it will perhaps be of interest to mention Mr. Robt. Bennett, who may be termed an expert in this line by virtue of 25 years' experience in the United States and Canada. Last year he obtained contracts in connection with the Molsons Bank, Toronto; McLaughlin Automobile Garage, Oshawa; Lincoln Paper Mills, Merritton, Ont.; Upper Canada Bible Society's building, Toronto; Lumsden Building (10 storeys), Toronto; Hobberlin Building, Toronto; Oakwood High School, and Annette Street School, Toronto. It may be of interest to refer to the Lumsden Building, in which Mr. Bennett engaged to construct the ten floors of terra cotta arching within eight weeks from the date of commencement. He completed the work in seven weeks and three and one-half days. Mr. Bennett employs a large staff of competent men and is well known to the Toronto building trade.

The Allied Trades and Labor Association of Ottwa, representing 300 international union men of the city, have asked the Board of Control to legislate with a view to preventing work being done for the corporation outside the city. The objection was made that a contract for hydrants and valves had been sublet by a local concern to a firm in Brantford.

The Minister of Marine has approved plans for the continuation of the extensive improvement works on the Montreal harbor. The total outlay during the present season will be between $1,500,000 and $2,000,000. Under the heading of entirely new works is the construction of four new sheds in reinforced concrete on the Tarte pier. As is well known, this season's work is a part of a general scheme involving, through annual instalments, a total expenditure of about $18,000,000.

The J. I. Case Threshing Machine Company, of Racine, Wisconsin, have entered two Case cars in the 2,300-mile reliability run conducted by the Modern Power Publishing Company, of Winnipeg, Man. This tour covers the three provinces of Manitoba, Saskatchewan and Alberta. The cars leave Winnipeg about the first of August and proceed west from Brandon 133 miles, then northwest to Saskatoon, and from there almost due west to Edmonton. From Edmonton the tour proceeds south to Calgary, back east through Regina, and then back to Winnipeg. This tour will last about two weeks.

We are indebted to the Wm. T. Comstock Company, 23 Warren street, New York, for a copy of "Garages and Motor Boat Houses," an excellently illustrated and informative work that will doubtless receive careful study on the part of architect and builder. The book contains a large number of designs for both private and commercial buildings, showing the latest ideas in their planning and construction. The designs are contributed by prominent architects from different sections of the United States and are [illegible] of the best practice in the line of work.

Effect of Hypochlorite of Lime on Metals

Wrought Iron Pipe and Copper Tank Lining Affected Most Readily Brass Pipe Very Slowly — Tin Resists Action Well

By Harold C. Stevens

The Board of Water Supply of the city of New York, in connection with the design of sanitary works for the protection of watersheds through which the Catskill aqueduct is being constructed, has had occasion to seek information regarding the effect of hypochlorite of lime solution upon metals, and in the operation of the works has gained further information. Systematic observations have not been made, and the corrosive effects under apparently similar conditions have differed quite widely; but the data obtained are useful in that they indicate in a general way what may be expected.

Wrought Iron Pipe Suffers Most.

Wrought iron pipe is most readily affected. The inverts of 2-in. pipes having a trickling flow of a 1 per cent. solution through them have been completely rusted through in about four months. Three-inch galvanized iron pipes, conveying at different times 1 per cent. and ½ per cent solutions and flowing full, were replaced after about a year's service, not on account of rusting through, but on account of clogging due to the formation of tubercles and the accumulation of a deposit of lime. These pipes probably lasted longer than would have been the case with the plain wrought-iron pipes, because zinc is quite resistant to corrosion, and, where galvanizing is perfect, would prevent the formation of tubercles long enough to permit the coating of lime to form and prevent further corrosion. The galvanizing of commercial pipe is far from perfect, however, and also in making joints the zinc coating is necessarily injured, so that only a partial protection of the iron results. Galvanized stove pipe has remained in serviceable condition for four months, while plain iron stovepipe in the same place has been ruined. The galvanizing, however, now shows rust specks all over.

Brass pipe is corroded by hypochlorite of lime solution, but very much less than iron; in fact, very slowly. Tubercles do not form and the pipe becomes coated with a smooth layer of lime that protects that brass from further action. The effect on the flow in this case is due only to the gradual reduction in the size of the duct. It seems reasonable to expect that brass pipe, say 2 inches in diameter, would last two or three times as long as iron pipe, before renewal or cleaning would become necessary. Moreover, the coating in brass pipes could be cleaned out with acid and the pipe be made as serviceable as originally, with threads uninjured, whereas iron pipe so cleaned would be found rough and a great deal damaged.

At Board of Water Supply plants, where a 2 per cent. solution was used for one month and a 1 per cent. solution thereafter, bronze float valves are practically perfect after four months' service with a trickle of solution flowing through them, but the seats have become coated with lime and consequently do not close properly. On scraping off some of this coating the bronze appears to be intact. A long brass valve stem in a hypochlorite of lime solution tank after three months showed general pitting, but to a very slight depth. A brass screen of about No. 18 wire immersed in the solution was destroyed in less than four months, while another, under almost like conditions, has remained in good condition. The screen destroyed was made of very soft brass.

Copper Tank Lining Destroyed in Three Weeks.

From such observations as were available at the time of designing certain of the Board of Water Supply plants, it was thought that copper of about 20 gauge would be a good material for orifice cans, floats, and for lining small tanks. Its value was much over-estimated, however, for in one case a copper tank lining was eaten through in less than three weeks; and in another case an orifice can became leaky in about three months. Floats made of No. 22 copper have become leaky in about three months, being badly pitted on all the surface in contact with the hypochlorite of lime solution. The leaky orifice can was effectively repaired with solder which has resisted corrosion very well. It has not been pitted and the only effect upon it that has been noted has been a blackening of the surface.

Tin appears to resist the action of hypochlorite of lime solution very well. Two ordinary tinned copper ball floats, in solution of ½ per cent. to 1 per cent. strength, lasted for 19 months, and one was still serviceable. A similar larger float, in 2 per cent. solution for one month and in 1 per cent. solution thereafter, has been in service for four months and appears to be in perfect condition. There is a slight coating on the surface, but if this is scraped off, bright tin appears underneath.

Bronze orifice plates made of "Worthington anti-corrosive metal" have stood well. The edges are not quite so sharp as originally, but the discharge coefficient has increased during nearly two years of service only about 3 per cent. Part of this effect can be attributed to wear rather than corrosion.

The effect of hypochlorite on one large metal main was to detach the organic matter, which quickly appeared at the reservoirs. The next gauging of the pipe showed an increase in carrying capacity of about 6 per cent. from the previous year, whereas theretofore there had been an average yearly reduction of about 4 per cent. in carrying capacity. It is to be expected that similar effects would always be observed in supply mains leading from reservoirs, for in such cases vegetable growths have a large effect on the carrying capacity. No observations have been made on the corrosive effects in metal mains, but a strong hope seems justified that no material damage will result, since the dose is minute and by far the greater part of the applied chemical is taken up by organic matter in the water before it has a chance to come in contact with the pipe. The point of application of the chemical would, of course, have an effect on the results. A relatively long period between the application of the dose and the entrance of the treated water into the pipe would lessen the tendency of action on the pipe.

Wood Rapidly Affected.

Wood is readily affected by hypochlorite solution. Mixing tanks of white pine began to show serious damage within a month, the end grain at the rabbet being affected most and so softened that it could be crushed or scraped out. Storage tanks containing 2 per cent. solution were not much affected during the same time. All tanks, however, were lined with cement mortar shortly afterwards. Wooden stilling boxes have lasted for nearly two years in solutions of ½ per cent. and 1 per cent. strength, but at the end of a year and a half the wood was found to be so softened that the edges could be broken off with the hand. Wooden floats boiled in paraffine and coated with a thick layer of paraffine have been used successfully. They appeared to be entirely unaffected after many months of service.

Effect of Electric Current on Concrete and Steel

An interesting research has been carried out in the Natural Philosophy School of the University of Melbourne by the aid of funds furnished by the Governemnt of Victoria, Australia, with the object of determining the effect of electric currents on reinforced concrete.

According to the Engineering News, which publishes full details, the series of tests tends to prove:

(1) That rusting and pitting of reinforcing and structural steel occurs at the anode.

(2) That this rusting by its growth causes rupture of the concrete and the development of large cracks.

(3) That very small currents, e.g., 0.02 amps., will cause such rusting and cracking.

(4) That when steel is cathode no rusting of the steel or cracking of the concrete will occur with currents up to 0.06 amps. during 200 days.

(5) That sandstone and brick will behave similarly to concrete, showing even less resistance to cracking.

(6) That damp earth supplies sufficient moisture to concrete to render it conducive to a current which will cause cracking.

(7) That alternating currents of the magnitude of 3 amps. will produce cracks by thermal action, but no rusting.

(8) That the thermal action, when measured by a thermometer, of currents of the magnitude of 0.05 amps. is negligible in blocks of concrete.

Fire Resistance of Bricks

In the Proceedings of the Engineers' Society of Western Pennsylvania particulars are given of experiments conducted on different classes of bricks. It was found that with mixtures of magnetite and marble with kaolin, the refractoriness of the magnetite brick decreases as the amount of clay increases, and the same applies to the addition of lime. With mixtures of alumina and silica, additions of kaolin bring down the melting point of pure alumina considerably below the normal value of about 2,000 deg. C., and if quartz be added with 9.1 per cent. alumina the melting point is reduced to about 1,566 deg. C., after which a very small amount of alumina raises the melting point rapidly to 1,790 deg. C.—the melting point of pure silica. In the case of a silica brick with a certain amount of clay introduced as a binder, it was found that as the amount of clay is increased the refractoriness rapidly falls off after the added amount reaches 6 per cent. This points to the desirability of making bricks either very high in silica or entirely of clay. Other investigations indicated the effect of potash, soda, lime, magnesia, and iron on the melting point of clay. Slight additions of the fluxes named reduced the melting point, the reduction being proportionate to the quantities added.

Tests of Structural Materials

The eighth annual report of the United States Secretary of Commerce and Labor, just to hand from Washington, contains the following information in regard to a portion of the work of the Bureau of Standards:

The work of testing of engineering instruments and structural and other materials has steadily advanced. Additional space for the work has been provided and the erection of machines and instruments is now under way in the new laboratory. A 100,000-pound universal testing machine, already erected, has shown accurate and reliable results. The Bureau has also installed a 1,000,000-pound Riehle crushing machine for testing stone, brick, terra cotta, cement, and concrete, and for determining the moduli of elasticity of building materials and structural forms. A 2,400,000-pound Emery machine will soon be installed for investigating physical properties of materials and the constants required by engineers in computing structural designs. The construction of the large Emery machine for testing full-sized structural members and shapes is well advanced and the foundation is in place. Freezing chambers and special furnaces for fire tests of ceramic materials are being built. Investigations are also in progress as to methods of testing torsion, cold-bending, alternating impact, alternating stress, and hardness.

A new method of determining stresses and strains in large structural members used in bridges and buildings has been devised and tested on the Rock Creek Bridge, at Washington, D.C., and on the Ohio River Bridge, at Beaver Falls, Pa. This new method promises fruitful results in testing the safety of bridges and buildings while under construction and without the use of large testing machines. The method is also applicable to a study of lap-welded boilers and the deformation resulting from stresses.

The bureau tests have covered a wide range of metals and structural materials and have been made for all the government departments. The number of tests of miscellaneous materials has increased 50 per cent. With special equipment the bureau is to make investigations and assist in preparing specifications for government materials and to aid in the adoption of uniform standards in the industries.

The bureau tested four times as many engineering instruments as in the previous year, including anemometers, pressure gauges and water-current meters. The Geological Survey has transferred to the Bureau the Chevy Chase Lake station for calibration of water-current meters. The station has been improved and an investigation of Price meters is now in progress.

To Prevent Dusting of Concrete Floors

To prevent dusting of concrete floors already laid the following remedy is recommended by Mr. Albert Moyer:

Wash the floor thoroughly with clean water, scrubbing with a stiff broom or scrubbing brush, removing all dirt and loose particles. Allow the surface to dry. As soon as dry apply a solution of one part waterglass (sodium silicate), and three to four parts of water, the proportion of water depending upon the porosity of the concrete. The denser the concrete the weaker the solution required. Stir well, and apply this mixture with a brush (a large whitewash brush with long handle will be found the most economical). Do not mix a greater quantity than can be used in an hour.

If this solution is sufficiently thin, it will penetrate the pores of the concrete. Allow the concrete surface thus treated to dry. As soon as dry, wash off with clean water, using a mop. Again allow the surface to dry and apply the solution as before. Allow to dry and again wash off with clean water, using a mop. As soon as the surface is again dry, apply the solution as before. If the third coat does not flush to the surface apply another coat as above.

The sodium silicate, which remains on the surface, not having come in contact with the other alkalies in the concrete, is readily soluble in water and can therefore be easily washed off, thus evening up the color and texture of the floor. That which has penetrated into the pores, having come in contact with the other alkalies in the concrete, has formed into an insoluble and very hard material, hardening the surface, preventing dusting and adding materially to the wearing value of the floor.

Grading of Materials in the Aggregate

Success or Failure in Construction Dependent Largely upon Scientific Mixture of Constituents Satisfactory Practice and Otherwise—Recent Tests

By H. P. Bowes, Supt. Warren Bituminous Paving Company, Toronto*

The [illegible] with which I am connected, namely the Warren Bituminous Paving Company, have made a specialty of the grading of the materials used in the surface coat of roadways and have met with a great deal of success.

The specifications for the grading which they have adopted call for the mineral aggregate being proportioned [illegible] to produce a mass having 21 per cent. or less of voids at the time of construction. They have found that any method of construction calling for the use of mineral aggregate will reach a degree of perfection proportionate to the ability in so grading or arranging the mineral constituents as to reduce to a minimum the existing voids. Then with the addition of the proper mortar a mass will result which will not only be dense but nearly waterproof. Upon the other hand the farther these principles are receded from, the more certain failure is courted. It would then seem that the paramount principle is the proper grading of the mineral constituents.

Perhaps this subject really applies more forcibly to reinforced concrete work where great strength is required for the least possible weight. For large and important structures it pays from an economic standpoint to make very thorough studies of the materials of the aggregates and their relative proportions. This fact has been seriously overlooked in the past and thousands of dollars have sometimes been wasted on single jobs by neglecting laboratory studies or by errors in theory.

Since cement is always the most expensive ingredient, the reduction of its quantity—which may very frequently be made by adjusting the proportions of the aggregate so as to use less cement and yet produce a concrete with the same density, strength and impermeability together with the reduction of size—is of the utmost importance.

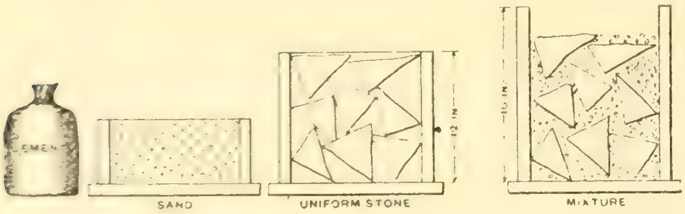


Fig. 1—Diagram illustrating measurement of dry materials and mixture when broken stone is of uniform size.

If gravel or stone, having particles of uniform size, is used, it must be recognized that the work will cost 10 per cent. or upwards more on account of the additional quantity of material required to make a given volume of concrete.

In measuring the gravel or stone before mixing there will be less solid matter in the measure, and consequently more sand and cement will be necessary to fill the spaces between the stones. This fact, which is often overlooked—even by experienced men, is illustrated in a somewhat exaggerated fashion in figures 1 and 2. The proportions of this particular mix are 1-2, ½-5.

Here figure 1 illustrates the measurement of the dry materials and the mixture produced therefrom when the stone has been screened to one uniform size, while figure 2 shows the dry materials and the mixture when the stone has been graded somewhat.

It is obvious at a glance that the uniform stone measured in figure 1 contains less solid stone than the graded stone measured in figure 2. The spaces between the stones in the first case are very nearly equal to the volume of the solid particles, and as the measure of sand is one-half that of the stone and the particles of cement fill the voids in the sand, this sand and cement mixes in between the stones filling the spaces or voids and resulting in a mixture but very slightly greater in volume than the stone alone.

In the second case, figure 2, the spaces between the large stones in the stone measure are filled with graded smaller stones so that there is a much smaller volume of spaces or voids. Hence when the sand and cement, which are identical with that in figure 1, are mixed with it the volume of the mixture becomes considerably larger than the original bulk of the stone. Consequently, if we are tied to definite proportions of materials, more concrete will be made with graded stone than if the stone has been screened to a uniform size.

If, on the other hand, the proportions of the materials are changed on account of the fewer voids in the mixed stone, and less sand and cement are used, a saving in these materials results.

Proportioning by Void Determination.

The method often used in determining the voids in stone and sand, by finding the quantity of water that can be poured into the voids of a unit measure of stone or sand, and then the amount of sand or cement as the amount required to fill the voids in the stone or sand, is not satisfactory. The greatest inaccuracy of this method is due to the difference in compactness of the material under varied methods of handling and to teh fact that the actual volume of voids in a coarse material may not correspond to the quantity of sand required to fill the voids; for the grains of sand separate the stone, and with most aggregate a portion of the sand is too coarse to get into the voids of the coarser material. That is, in a mass of graded stone many of the individual voids are so small that the larger grains of natural bank sand will not fit into them but will get between the stones and increase the bulk of the mass. This increase in bulk means that more sand is required than the actual volume of voids in the coarser material.

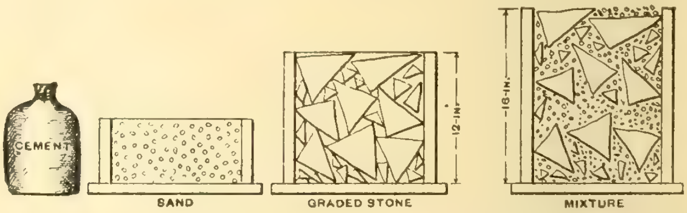


Fig. 2—Dry materials and mixture when the stone is of varying sizes.

Perhaps the most practical way of obtaining the desired proportions is by

Volumetric Proportioning by Trial Mixtures.

An accurate and simple method to do this is by trial batches. The apparatus is easily obtained at any time, consisting as it does of a scale and a cylinder which may be a piece of wrought iron pipe 10 to 12 inches in diameter capped at one end. Measure and weigh the cement and stone and water, and mix on a piece of sheet steel or other non-absorbent material. The mixture should be of the same constituency as intended to be used in the work. The mixture is placed in the cylinder, carefully tamped and the height to which the pipe is filled is noted.

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* Read before the Canadian Cement and Concrete Association, March 7th, 1911

The pipe should be weighed both before and after being filled, so as to check the weight of the material. The cylinder is then emptied and cleaned.

Mix up another batch, using the same amount of cement and water, slightly varying the ratio of the sand and stone, but having the same total weight as before. Note carefully the height in the cylinder again which will be a guide to the other batches to be mixed. Trials are made until a mixture is found that gives the least height in the cylinder and at the same time works well while mixing, all the stones being covered with mortar, and which makes a good appearance.

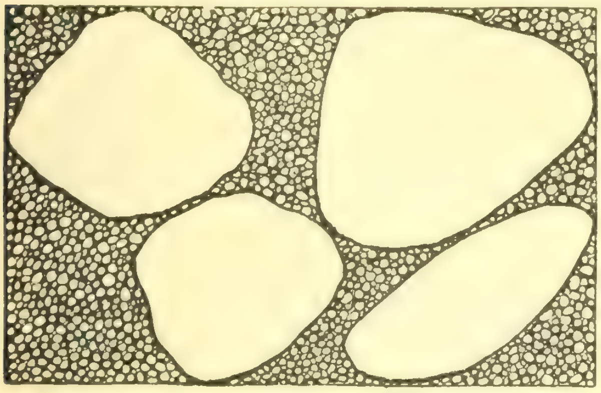

Fig. 3 Large stones with voids filled with sand

This method gives fairly good results but does not give the changes in the physical sizes of the sand and stone so as to secure the most economical composition as would be shown by a thorough mechanical analysis.

Mr. A. E. Schutte in studying the proportions of materials for bituminous macadam pavement for the Warren Brothers Company has very effectively developed the method of volumetric synthesis with dry materials. His experiments included various classes and sizes of stone, sand and screenings, ranging from three inches in diameter down to that which passes a 200-mesh sieve. He found that the best method for compacting dry materials such as sand, gravel or broken stone, is to place them in a vessel the shape of a cone, with the largest diameter at the bottom. The cone is filled with the coarsest material and taken by a laborer who compacts it by repeatedly striking the cone against the ground, keeping the measure full by adding new material of the same kind. When it ceases to settle the contents are emptied and mixed with a portion of a finer material replaced in the measure and compacted as before.

By repeated trials are determined the exact size and maximum volume of successive finer materials which may be added without appreciably increasing the bulk of the coarsest after thoroughly compacting. Mr. Schutte has found that for different shapes of particles the proportions of each size must be varied, but having determined the required percentage for a certain stone, that is for a stone from a certain quarry, the proportion of the sizes from day to day need be varied but little.

Effect of Grading Aggregate on the Density of Concrete

The fact that the densest mixture is secured with particles of different sizes is very evident from Figs. 3 and 3a. It follows that the least density, and hence the greatest percentage of voids, occurs when the grains are all of one size. The converse of this proposition that the smallest percentage of voids occurs in a mixture graded so that the voids of each size are filled with the largest particles which will enter them, is illustrated in figure 4. This is very important in its application to the selection of materials for concrete. The mass of this last mixture is evidently denser; that is, it contains more solid material. This relates directly to the differences between mortar and concrete. The substitution of stones for small masses of sand reduces the voids and consequently the quantity of cement required. Extending this principle to the fixing of the proportion of sand and stone it is evident that for maximum economy and equal strength there should be used the largest possible quantity of stone in proportion to the sand.

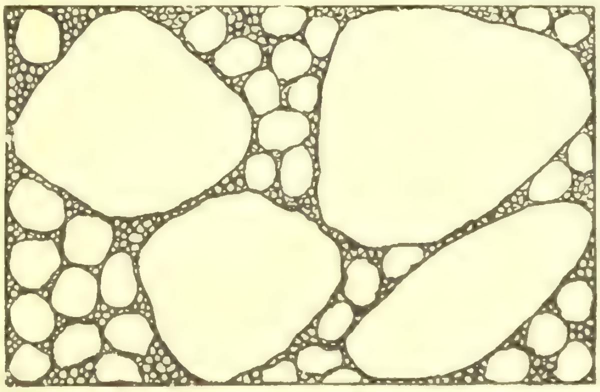

Fig. 3a. Large stones filled with small stones and sand.

Mr. Fuller, who has experimented a good deal along this line, found that by grading the materials of his aggregate, figuring at a point where he only required one part of sand to five parts of stone, that for this mix the modulus of rupture was 504 lbs. per square inch. As he increased the amount of sand the strength decreased; when he reached equal parts of sand and stone the modulus of rupture was 355 lbs. per square inch, and when he had twice as much sand as stone the modulus of rupture was 210 lbs. per square inch. The total amount of aggregate in each case was the same, namely, 1 part cement to 6 parts sand and stone.

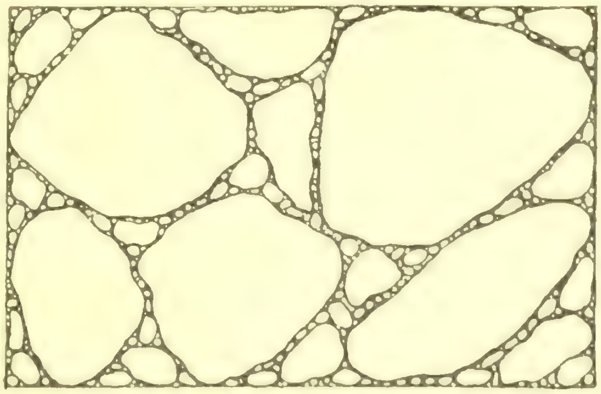

Fig. 4. Large stones, with voids filled with medium sized stones surrounded by smaller stones and sand so as to give graded mixture

In 1901 tests were made at the New Jersey Water Company's reservoir on the comparative strength of different proportions of concrete aggregate. These tests indicated that for the materials used there was a certain mixture of sizes of the aggregate which, with a given percentage by weight of cement to the total aggregate, gave the highest breaking strength. In practice it was also found that the concrete made with this mixture worked more smoothly in placing. These tests led to a more extended series of experiments by Mr. Sanford Thompson and Frederick Taylor at Jerome Park reservoir, New York. The method of procedure and results of tests are given by Wm. B. Fuller and Sandford Thompson (Transactions of American Society Civil Engineers, Vol. 59, page 67, 1907). The mechanical analysis diagram of their tests furnished a ready means of studying the effect of various sized particles on the density of concrete. For this purpose crusher run stone and bank gravel were screened into twenty-one sizes ranging from 3 in. down to that passing a 100 mesh sieve. Over 400 tests were made with different combinations of the sizes of stones to obtain the proportions which would produce the densest concrete mixture. From these tests they derived the following laws:

(1) Aggregate in which parts have been specially graded in sizes so as to give when water and cement are added an artificial mixture of greatest density produces concrete of higher strength than mixtures of cement and natural materials in similar proportions. The average improvement in strength by artificial grading under the conditions of tests was about 14 per cent. Comparing the tests of strength of concrete having different percentage of cement it is found that for similar strength the best artificially graded aggregate would require about 12 per cent. less cement than like mixtures of ungraded material.

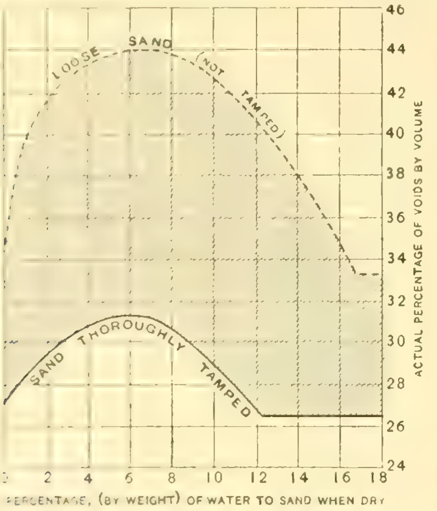

Fig 5.—Percentage of absolute voids in a natural bank sand, containing varying percentages of moisture.

(2) That the strength and density of concrete is affected but slightly, if at all, by decreasing the quantity of medium stone of the aggregate and increasing the quantity of coarsest stone. An excess of stone of medium size on the other hand appreciably decreases the density and strength of the concrete.

Perhaps it might be worth while calling attention to the effect which dampness has on the volume of sand and stone screenings and stone, especially sand and stone screenings, and hence the allowance necessary to make for this. This diagram, figure 5, was plotted by Mr. Fuller from experiments from a single sample of natural sand mixed by weight with varying percentages of water, and illustrates the effects of moisture upon the actual percentage of voids in sands loose and tamped. The volume produced by varying degrees of compacting are located between two curves. It is noticeable that both loose and tamped sands increase in volume with the addition of water, and reach a maximum at about 6 per cent. of water, then decrease to slightly less than their original bulk. The same sand it may be seen may contain from 27 to 44 per cent. of absolute voids according to the percentage of water and degree of compacting. The percentage of water by weight which will give the greatest bulk corresponding of course to the largest percentage of voids varies with different sands from 5 to 8 per cent.

In Fig. 6 there is shown an ordinary stone crushing outfit with a sectional screen of three different sizes of mesh. The screen used by the Warren Brothers Company is composed of one screen within the other. The stone is of course delivered into the end of the screen, which contains the smallest openings. The inside screen of the first section would be about ¼ in. mesh, and the outside about a ten mesh and not quite so long as the ¼ in. section, so that the fine material passing the ten mesh would fall directly into a bin below and the ¼ in. be delivered from the end of the outside screen to another bin. Similarly with the other two sections the second section would be about ¾ in. inside and ½ in. outside and the third 1½ in. inside and 1 in. outside. This of course only permits the grading of the stone into six different sizes.

The bins for receiving have a chute at the bottom with a slide to control the flow of the stone. Below these bins is a hopper set on a six beam scale so that the desired amount of each size of stone can be drawn into the hopper without changing the weights on the beams. Of course this method would not be applicable to concrete work unless the mixer was set directly below the hopper, for if the materials are loaded into wagons or carts and dumped in piles the large stones roll to the outside of the pile and very little good results from the previous grading.

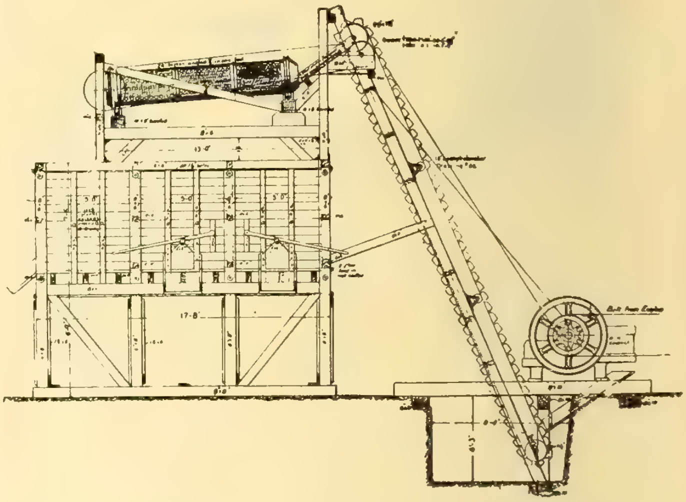

Fig 6 —Small crushing plant with elevator, screen, and portable bins.

The only feasible manner to take care of the different sizes of stone, if the screens are not near the work, is to use bins to hold the different sizes.

Figure 7 shows a sawed section of bitulithic pavement taken from Palmerston Boulevard, Toronto. This shows the grading of the different sizes of stone in the pavement and the way in which they inter-mix with each other. The sizes of stone in this sample range all the way from 200 mesh material up to 1½ in.

Professor Gillespie and the writer recently crushed two blocks of concrete. One was made of an aggregate of one inch stone and sand (1:3:5), the total aggregate when dry weighing thirty pounds. To this was added five pounds of cement mixed with water and placed in a box eight inches square. The other sample was made of a graded aggregate of the following proportions: 1-in. stone 3 lbs.; ¾-in. stone 7 lbs.; ½-in. stone 6 lbs.; ¼-in. stone 5 lbs.; 8 mesh material ½ lb.; 16 mesh material 1½ lbs.; 20 mesh material 1½ lbs.; 50 mesh material 3 lbs.; 80 mesh material 1 lb.; 100 mesh material 1 lb.; 200 mesh material ½ lb.; total 30 lbs. as before.

This mixture was mixed with the same amount by weight of cement as the previous sample and put in the same sized box. The two samples were kept side by side as they dried so that all conditions, except the grading of the aggregate, were identically the same in each case. The blocks were only six days old when crushed, this accounting for their comparatively low strength. For the ungraded sample the load at point of failure was 560 pounds per square inch and for the sample with graded aggregate 679 pounds per square inch—a gain in strength, by grading the aggregate, of 21 per cent.

I have given this paper not with the feeling that what little I know would help you very materially, but in the hope that perhaps some of you who have not been interested in this branch of the subject might appreciate better the advantages obtained by a scientific mixture of the aggregate and that you might realize the field for research that there is in this work. I am indebted to Taylor & Thompson's book on concrete for some of the foregoing illustrations and also for a number of useful pointers.

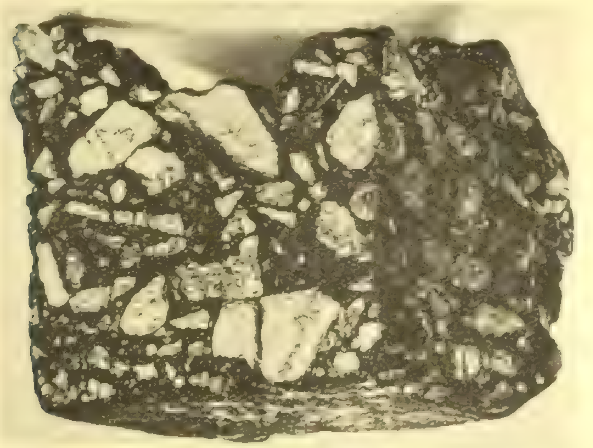

Fig. 7—Sawed section of Bitulithic Pavement.

Contractors' Suit at Edmonton

At Winnipeg judgment was delivered recently in the action of Grace vs. Osler, the decision being in favor of the defandants. The plaintiffs were Wm. Grace & Co., who contracted to erect a five-storey building on the corner of Portage avenue and Main street, Winnipeg, for Messrs. Osler, Hammond & Nanton.

After the walls were up and the roof and concrete floors an accident occurred to the basement walls resulting in considerable damage, and the owners terminated the employment of the plaintiffs under the provisions of the contract and completed the building themselves, on the ground that the damage was due to the default of the plaintiffs, and that they had refused to repair it except as extra work, for which they should be paid.

Plaintiffs sued for a balance of $48,000, claimed to be due under the contract for work done and materials supplied, including a large amount of extras, up to the time their employment was terminated. They charge that the accident to the walls was due to the negligence or lack of judgment of the architects, and that they were not responsible therefor.

On the question of delays the finding is in favor of the plaintiffs, and states that much of the extra work was ordered; that the architects were dilatory in the supply of plans and details, and that there was delay in the supply of cut stone.

The judgment concludes as follows:

"On the facts as well as the law, I think the plaintiffs are not entitled to unliquidated damages for non-completion to time. The result is the plaintiffs' claim should be dismissed with costs to be added by the defendant to the amount recovered upon their counterclaim.

On the counterclaim there will be judgment referring it to the master to take the following accounts:

1. To find the amount earned by the plaintiffs for work done and materials provided in the execution of the contract, including extras properly ordered, up to the time defendents terminated plaintiffs's employment.

2. The value of the extras ordered or partially so up to that time by plaintiffs.

3. The reasonable cost of restoring and rebuilding the damaged foundation walls in accordance with the original plans and specifications, not including levelling up the building.

4. What it would have cost at that time to have levelled up the building.

5. The amount of damage to the adjoining Canadian Northern Railway building caused by the subsidence of the defendants' building.

6. The reasonable cost of completing the building after the defendants terminated plaintiffs employment according to the original plans and specifications.

7. The reasonable cost of completing any extras ordered and begun by the plaintiffs and finished by defendants.

Further directions and costs of reference and of counterclaim were received.

Among the recent important contracts secured by the Carter-Halls-Aldinger Company, Limited, Winnipeg, may be mentioned the administration building, which the provincial government of Manitoba is building at the new Agricultural College, at St. Vital, a beautiful location on the Red river just outside of Winnipeg. The contract price for the building is $229,000. The structure will be fireproof, faced with stone and pressed brick. It is the first of a number of buildings to be erected by the government in this connection. The Carter-Halls-Aldinger Company also have under construction at Winnipeg an 8-storey reinforced concrete building with ornamental terra cotta front, for the Gowans Kent Company.

It is reported in Montreal that the Canadian Pacific Railway will have work started in the spring on a line paralleling the Grand Trunk to Toronto. It is said that the new line will commence at Bathurst, ten miles west of Smith's Falls, and proceed southwesterly to Belleville. The whole of this line, it is said, will be double-tracked, and as the line between Smith's Falls and Montreal is double tracked already, the C. P. R. will have a double track all the way between Montreal and Toronto, and an alternative route between Smith's Falls and Toronto and will reach all the important industrial communities between Montreal and Toronto now served by the Grand Trunk alone.

Among the out of town visitors at the Cement Show last week may be mentioned Mr. T. R. Van Hamm, of the editorial staff of Rock Products, Chicago; C. F. Till, representing H. C. Hitch & Company, general contractors, Montreal; Chas. Warnock, of Robt. W. Hunt & Company, Montreal, Jas. A. McNair, president of the Dominion Glazed Cement Pipe Company, Vancouver; J. A. Jamieson, consulting engineer, Montreal; C. Erland, London, Eng.

The [illegible] well represented at the Cement Show. In addition to the Contract Record, the following had booths: the Canadian Engineer, Construction, and the Builder and Contractor. The Canadian Engineer issued a daily bulletin, a breezy little publication which was well received by the exhibitors.

Advantages of Reinforced Concrete Work

Its General Safety and Expediency—Progress Somewhat Retarded in Canada by Improper Building By-laws — Practical Pointers — Care in Estimating

By C. A. P. Turner *

In dealing with the subject of reinforced concrete, I shall endeavor to discuss:

First, its field of usefulness in reducing the enormous fire loss incident to cheap timber construction in Canada and the United States;

Second, the safety of the construction, in treating of general types;

Third, the objection to its adoption held by old-fashioned architects and engineers;

Fourth, the obstacles placed in the way of its adoption through ignorant legislation or ill-advised building laws, which in many cities encourages more dangerous types of construction.

Finally, I shall endeavor to bring out the useful points and hints to the builder, which may aid in securing satisfactory work.

Heavy Fire Waste.

A statement given in the bulletin of the United States Geological Survey, treating of the fire tax and waste due to this cause, is as follows:

> "The total cost of fires in the United States in 1907 amounted to almost one-half the cost of new buildings constructed in the country for the year. The total cost of the fires, excluding that of forest fires and marine losses, but including excess cost of fire protection due to bad construction, and excess premiums over insurance paid, amounted to over $465,485,000, a tax on the people exceeding the total value of the gold, silver, copper, and petroleum, produced in the United States in that year.
>
> "The actual fire losses due to the destruction of buildings and their contents amounted to $215,084,709, a per capita loss for the United States of $2.51. The per capita losses in the cities of the six leading European countries amounted to but 33 cents, or about one-eighth the per capita loss sustained in the United States. In addition to this waste of wealth and natural resources, 1,449 persons were killed and 5,564 were injured in fires."

The remedy for this great loss, both in life and property, evidently lies in better building—in building non-combustible types of construction. Now this question involves the question of cost and under the present conditions, reinforced concrete is the material to which we must look to solve this problem of better building on an economic basis.

In many sections of Canada, a reinforced concrete building, economically designed, can be put up to compete with heavy timber mill construction. For lighter buildings, the cost of reinforced concrete is greater than timber, but for high office buildings, which are usually constructed with structural steel frame, a material saving can be secured by the use of reinforced concrete construction.

Properly designed, reinforced concrete may be more quickly and safely erected than any other type of building. This statement is made as the result of the writer's experience in the past twenty years in structural steel designing, and for the past ten years in the design of reinforced concrete construction, and he believes that with this experience he has thoroughly familiarized himself with the advantages and disadvantages of both types.

As regards safety of construction, there have been admittedly a number of failures in the erection of reinforced concrete buildings. There have also been failures in the erection of steel work and in the erection of timber construction—in fact, wherever ignorance of proper design and scientific methods of erection have been displayed in the design or execution of the work. In the history of concrete work, however, the following general statement may be made:

As far as the writer is aware, no failures have occurred in floors reinforced in multiple directions. Practically all failures have occurred with one-way reinforcement, and where there was an insufficient lap of the reinforcing metal over the support. In other words, safe concrete floor construction requires ample lap of the reinforcement over the supports and the thorough tieing of the work together.

In the line of column construction, the writer does not know of a single failure where the column was well hooped and reinforced with a reasonable proportion of vertical steel. There have been a number of failures where an insignificant amount of hooping was used and a large amount of vertical reinforcement. Difficulty has occurred with columns which had a reasonable amount of hooping and an insignificant amount of vertical steel. These failures occurring with certain specific types or classes of design which are, from the engineering standpoint, inherently objectionable, have led to unwarranted general condemnation of reinforced concrete by those interested in other types of construction.

Thus it is evident that every one engaged in the reinforced concrete field is injured more or less by every failure, no matter what the cause. This being the case, it is incumbent on those who are commercially interested in the business, to point out questionable methods of design and construction and the risk involved.

Defective Building Ordinances in Canadian Cities.

Unfortunately for those engaged in this line of business, municipal building regulations are frequently adopted, covering this class of construction, which have been formulated by those lacking in familiarity with the first principles of concrete construction. Thus you could find a few years ago, one city allowing for hooping and refusing to allow any value for vertical steel in the reinforcement of columns. You would find another city allowing high values for the vertical steel and absolutely nothing for the hooping. You would find one city requiring all beams to be designed as simple beams, while another city would demand continuity in beam design where practical.

The recent failure of the Henke building in Cleveland, is an example of the direct result which may be expected from improperly drawn building ordinances. In Cleveland, columns of moderate size designed in accordance with the Cleveland code, involve a high percentage of vertical steel and an insignificant amount of hooping. In the cold season of the year, column failure might occur during the sweating period of concrete which had been chilled and a complete collapse result as exhibited in this case. This collapse would never have occurred with a column designed with a suitable amount of hooping combined with a smaller amount of vertical steel.

The building codes of Toronto and Montreal seem open to the same serious objection as the old code of the city

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*Presented at the C. N. A. B. Convention, Winnipeg, Feb. 15-16.

of Cleveland. In Chicago and New York, building ordinances have been devised by those radically antagonistic to reinforced concrete, with the result that columns constructed for a tall building in accordance with the code of New York and Chicago would assume ungainly proportions.

The difference in the value of a reinforced concrete column, thoroughly hooped and vertically reinforced, and the ordinary type with the small amount of vertical steel with ties at intervale of a foot, will readily run four to five hundred per cent. For example, the writer has tested full sized columns, having a 14½ in. core, to 700 tons total load. A column having the same gross area with ordinary reinforcement, ties one foot centres and the same vertical steel, could not be expected to run over 200 or 250 tons.

Differences of this kind in the absolute value of the member under test should be properly considered in any rational code of building laws and failure to do this involves the expenditure of large sums which, as under the old code of Cleveland and under the present codes of Toronto and Montreal, are really wasted in the design of the work.

The general object of the building department should be to insure safe construction, rather than to see that a certain set of rules which do not of themselves produce this result, are followed.

Arbitrary Rulings.

In one of the large southern cities, the writer submitted a design which he guaranteed to the owner to have a test capacity of 1,000 pounds per square foot. The engineer of the Department of Buildings endeavored to figure this in accordance with his code as he interpreted it, and required no more steel but a different distribution of the same, which the writer could not guarantee for a test of more than six hundred pounds per square foot. He placed the facts squarely before the inspector and asked whether the department would assume the responsibility. "No, the department did not assume any responsibility at all in the matter." They were sorry that their code required more steel in certain parts and less in others, and our only way, if we were to make good our guarantee, was to add $1,000 worth of steel to the design of the building, simply to comply with the letter of the building code as interpreted by this particular engineer.

Many times, in the construction of this class of work, the contractor arbitrarily adds from one to five thousand dollars to the cost of the building in order to comply with the letter of some ordinance which insures expensive construction rather than safe construction to the business man putting up the building.

No body of men can bring more influence to bear on this question of reasonable and proper building requirements than the Canadian National Association of Builders.

An objection to the adoption of reinforced concrete frequently urged by the old-fashioned engineer and architect is that the contractor is so dishonest that he will skin a little cement here and there, and the integrity of the resulting structure will be doubtful

Unfortunately, the old-fashioned engineer and architect is not sufficiently familiar with the first principles of reinforced concrete construction, and his objection on this score is rather amusing, since if he credits the average contractor with any intelligence whatever, he should be aware of the fact that it is impossible to reduce the necessary amount of cement in the mix without requiring the temporary work or timber forms to be left in place a greater length of time than would be required with a richer and better mixture What the contractor could possibly save in cement he would lose four times in the additional amount of lumber required for centering and the additional time that it would require to finish the building. In other words, reinforced concrete construction is a line of business in which the work can be executed honestly at a lower cost than would result from an attempt to dishonestly use an insufficient amount of cement in the mixture, and there are few contractors who are so ignorant, after they have put up three or four buildings, that they fail to appreciate this fundamental of concrete construction.

On this question of dishonesty, of which the old-fashioned engineer and architect is wont to accuse the general contractor, on general principles if for no other reason, a word or two may not be amiss.

The writer's business is to a large extent, that of consulting expert for a large number of general contractors and builders. He has learned to appreciate their integrity by constant dealing with them. They desire to do work which will be creditable to their reputation as constructors. They have learned the lesson that a good reputation as a builder is a most valuable asset commercially, and that they cannot afford to lose this reputation by failure to make good. They have learned it to be a fact that the larger profit in the line of construction is secured by scientific and systematic management of the work; by looking sharply after the purchasing, seeing that the materials are delivered when they are needed to push forward the work, and suitable equipment is supplied and on the ground for the economic execution of the work, and that everything is carried on in an orderly and systematic manner, planned and laid out in advance. By so doing, the cost of executing the work may be kept down to a minimum.

These men, in paying the bill for the cost of construction, are inclined to check up rigidly with cold figures their ideas of theoretical economy as to what the work has actually cost, by carrying it out along different theoretical lines. They pay the bill, and in doing so, the results secured guide them in their judgment.

We might compare this class of men with some of those who pose as concrete experts in the engineering profession to-day. While I will not accuse these men of technical dishonesty, their business methods savors somewhat of the faker.

Concrete Experts, and Imitators.

About three years ago, a prominent structural bridge engineer in the United States, a man who has earned considerable reputation in the line of steel bridge work, delivered a lecture in one of our state universities, and when asked about concrete as a structural material stated to the boys that he was not familiar with what concrete men were doing in this line, but he did not think it amounted to very much. Since that time he has seen a great light. He has suddenly concluded that there was money in the concrete business, and after the six-day consideration, which it probably took to arrive at this conclusion, he came out as a full fledged concrete expert.

One of his early pieces of work in a large Pacific coast city was a report as expert on a reinforced concrete viaduct, designed on the Kahn system. Now this particular viaduct had been tested by the contractor with five times its working load on the sidewalk and five times its working load over a full panel of the roadway, and it had stood this test without injury and without indication of weakness. The design of this viaduct did not harmonize apparently with the peculiar theoretical notions of this expert without experience. Accordingly he directed that the viaduct be strengthened. What it would carry or might be tested to, cut no figure with his theories. The concrete was drilled into and additional rods added with the net result that, figuratively speaking, he had cut the liver out of the concrete and added a considerable amount of steel, and undoubtedly reduced the resulting strength of the structure from ten to twenty-five per cent, at an expenditure of approximately $10,000. When it came up for trial as to who is to pay the expenditure, the contractor or the city, unless this expert is able to hypnotize the judge into believing that his theoretical notions as to the strength of the structure are more reliable than the determination of its actual strength by the [illegible] in applying the actual test, then we may be certain that the taxpayers in that city will have a large bill to pay for the absurd recommendations of this so-called expert. It is fair to point out that this "expert," with practically no experience in the line of concrete work worth mentioning, has earned deservedly a high place in the American Society of Civil Engineers by his work in the field of steel construction, but work in this line does not qualify an engineer to assume the role which he has assumed in the line of concrete construction.

I brought up this instance which comes to my observation in order that your attention might be called to the class of men who too frequently are called in by municipalities to formulate a code governing the execution of reinforced concrete construction.

Men posing as experts, who are not actively engaged in the business and have no experience in this line of construction, are too frequently selected as experts to draw up rules and regulations governing the expenditure of the funds of the business man, putting up fireproof buildings. A large waste is occasioned thereby, and frequent accidents and loss of life are incurred through ignorant rules formulated by such men. Your influence as builders, through your various exchanges, can do much to remedy such conditions.

The credit for the advance of reinforced concrete must be given, not to the engineers and architects, but rather to the builder. Thus, engineers who have taken an active part in the promotion of this important industry have in nearly all cases been forced, in the early days of their career, to take contracts and guarantee their work, and stand behind it to the extent of every dollar they possessed. The humbug engineer to-day, who has had no experience, assumes no responsibility for his work, but merely tries to play on the fears of the prospective client that the general run of builders are indeed an unprincipled lot and in this way hopes to cover his own ignorance of construction, and the imposition he is practising on his client, by assuming the role of an expert, with no experience behind him to warrant his pretension.

Adequate Fireproofing.

A few words may not be amiss from the fireproof standpoint. In the Engineering News of February 2nd, the collapse of the Chamber of Commerce building in Cincinnati, Ohio, was quite fully discussed. This was of structural steel and tile, one part only not being well protected by fireproofing, namely, the trusses supporting the loft. A slight fire wrecked the trusses and they crashed down through the building, causing the destruction of almost a half million dollars worth of property and a number of lives.

The writer has seen many such structures where a moderate fire would wreck the column protection and cause the collapse of a large section of the building. This, because the building happened to have a structural steel skeleton, has given the owner a false idea of his security. A few actual fire tests in a finished structural steel and tile building, such as have been required of us in putting up concrete buildings, would emphasize this point. For example—test consisting of nearly a couple of cords of pine wood split into two inch square fagots, cob-piled, and thoroughly wet down with kerosene, the piled wood being within five feet of the bottom of the slab, and the hose being turned on after the floor was heated to pretty nearly a white. This was applied to a reinforced concrete building in which the floor had been loaded to about three times its working capacity under this test and returned to nearly its original position after the test and without material injury. Tests of this character would soon bring out the weakness of various so-called fireproof constructions and you would find that the better classes of reinforced concrete will stand such tests much better than any other type of reinforcing in use to-day.

Concrete construction possesses many things which recommend it to the Canadian contractor. First, he avoids many of the delays incident to structural steel construction. He eliminates the iron workers union in putting up the building. He can obtain steel rods as a rule on short notice from the mill. In fact he can obtain the necessary materials of construction to put up a reinforced concrete building in less time than is required to secure materials for any other type.

Constructional Pointers.

Under useful hints to the building of reinforced concrete, the first point which should be clearly born in mind, is that the strength of the concrete depends on the strength of the mortar matrix. That is, the proportion of the cement to sand in the mix. The coarse aggregate is merely a space filler and bears no relation to the strength of the concrete, where the strength of the aggregate is equal to or more than the strength of the cement matrix.

The point which the writer wishes to bring out clearly here is that the 1:2:4 mix, means a concrete of one cement, two sand and four of stone. These proportions cannot be interpreted to mean one cement to six parts by volume of gravel, where the proportion of the sand and stone in the gravel is indefinite.

In mixing, sufficient water should be used so that the concrete is plastic and will flow readily into place. In the summer season it is frequently best to wet down the stone pile, as during your long summer days the stone may absorb sufficient heat to set up the cement before the concrete can be placed in the work. Wetting the rock pile down will eliminate this difficulty.

In splicing, it is always best to splice a slab or beam vertically. A long inclined splice is invariably a source of weakness, since the inert material in the concrete rises to the surface and prevents a good bond between the new and old work.

In casting a column, it is best always to fill the column from the center. The writer has seen cases where the concrete was poured in from the side of the column and the space between the hooping, and the form filled up more rapidly than the centre of the column, the mortar was strained from the coarse aggregate, flowing to the centre of the column anad leaving the outside face of the column full of voids and the fireproofing portion outside of the hooping being of no strength whatever, making it necessary to remove it and recast the outer shell of the column.

The foreman or superintendent in charge should be trained to see that in all cases there is ample lap of the reinforcing metal over the support. Failure to do this frequently results in difficulty and trouble.

In handling work in hot weather the superintendent should see that the concrete does not dry out too rapidly, while in cool, frosty weather, as soon as the temperature reaches 40 deg. above zero, it is good policy to commence heating the water. Warming the water used in the mix up to about 120 deg., the concrete will then set up nearly as rapidly as during the summer season. When it gets colder than this it is necessary not only to heat the material, but also to see that the concrete is dried out and hardened by artificial heat. The cement, in cold chilly weather, unless the materials are heated and artificial heat applied, lies dormant and does not cure, or is liable at any rate to cure so slowly that the number of days which the forms are left in place has little to do with the time when they may be safely removed. In other words, the proper time to remove forms is when the concrete has become hard and rigid, irrespective of the number of days which the forms have remained in place. Frozen concrete cannot be detected as a rule from concrete cured by ordinary inspection. Cutting out a chunk, placing it on the hot stove and seeing whether it sweats and softens up is the only reliable guide to determine whether the concrete has been merely stiffened up by frost or has actually cured to an extent which would warrant one in trusting its strength.

Care in Estimating.

In estimating the cost of work, a word of caution may not be amiss to those who have had a limited experience in putting up reinforced concrete. Too often a contractor, who is a novice, has been imposed upon by the vender of reinforcement leading him to believe that centering may be put up at a far smaller figure than its actual cost—in that way misleading him into making a proposition for work which will not pay the cost of its execution. The writer has seen numerous cases where the general contractor in this way has put in an estimate much lower than he should have done. In nearly all cases, however, the contractor has been game enough to make good at his own expense, charge the bill up to experience, anad keep clear of the same mistake a second time.

Steel Window Frames

The effort to eliminate the immense waste of property and value due to fire losses has led to the development of fireproof construction, an effort which has been immensely aided by the increasing use of concrete, both plain and reinforced, in building construction.

The constructing engineer, in his search for fireproof materials, had been led to abandon certain natural stones, which either crack and break under the action of heat, or are so materially reduced in strength as to render their continued use a matter of uncertainty. He has also found that the true fireproof materials are those which have already been through the fire, and have consequently been tested and have developed the resistance to heat which is absolutely essential. Thus brick, cement, cinder, etc., together with certain other materials such as sand, certain kinds of stone, and, in general, the materials of concrete, are avaliable within their structural limitations.

When the use of the reinforcement of steel, imbedded within the concrete structure, was found to give the necessary tensile resistance, the field for genuine fireproof construction was opened. The steel necessary for strength could be so protected from heat as to remove its former weakness under the action of fire, while the wide applicability of concrete made it possible to abandon the use of combustible wood almost entirely.

The one detail in building construction for which wood retained its usefulness for some time appeared in the construction of window framing and sash. Concrete was here inapplicable, while the earlier attempts at the production of steel sash resulted in forms by no means so desirable as the wooden ones then in use.

A steel sash must be as light in weight as is consistent with strength, and it must offer the minimum obstruction to the pasage of light. It must be stiff enough to resist the pressure of heavy wind and strong enough to cary the weight of heavy glass. With these fundamental requirements come also those of tightness against weather and provision for ventilation.

To meet these conditions means that the sash must be manufactured according to mechanical principles, using rolled sections specially designed for the purpose to insure lightness, strength and proper methods of punction. It involves standardization of sizes, forms and construction, to meet the requirements of the architect, owner and builder, and to permit the use of proper sizes of glass. In short, it takes the manufacture of sash out of the scope of the woodworking mill, and compels the organization of a metallic sash manufacturing industry.

Such a development completes the possibility of the fireproof building and removes the last reason for the employment of any combustible material.

It also removes what has repeatedly been shown to be a serious menace to a building from without. It is of small avail for one owner to be careful in using fireproof construction if the fire in his neighbor's property can enter through his windows and work internal damage to the building in which the fire could not have originated

Canadian Railroad Development

A recent report of the House of Commons by the Department of Railways shows that 53.75 miles of the Atlantic, Quebec & Western Railway have been completed and that there remains to be constructed 48.65 miles. The department estimates that the cost om completion will be $769,508. W. L. Browne, New Carlisle, Que., is chief engineer.

Surveys for the main line of the Canadian Northern Ontario Railway, extending from Ottawa to Port Arthur, have been completed, and the exact location of the road, decided upon. It is believed that the work of construction will be commenced this year and that the road will be open for traffic at the end of three years.

It is reported that the Hill interests have broken off negotiations for the use of joint terminals in Winnipeg with the Canadian Northern Railway. It is said that a $1,000,000 station will be built in Winnipeg this spring for the Great Northern, Northern Pacific and Midland Railways. Three years ago the Hill interests purchased a right of way into the heart of the city at a very high figure. They will now construct a line from Emerson, where the lines enter Canada to Winnipeg.

The Canadian Pacific Railway, F. P. Busteed, general superintendent, Vancouver, B.C., has taken tenders for the construction of 30 miles of the Kootenay Central south from Golden, B.C. Ten miles of the grade out from Golden were completed several years ago and the new section will be an extension through the Columbia River Valley. The southern terminus will be Galloway station, on the main line of the Crow's Nest Pass Railway, near Cranbrook. The contract for building 30 miles of this line north from Galloway was awarded last year to Foley, Welsh & Stewart, and this work is nearing completion.

Among maintenance of way and improvement works to be undertaken by the Grand Trunk this year is the laying of 100-lb. steel rails on their double track line between Niagara Falls and London, Ont., in place of the 80-lb. rails now in use. Hundred-pound rails were laid throughout on the Montreal-Toronto line last year, and work on the Niagara Falls-London line will be undertaken this year as soon as the frost is out of the ground and the track settles. The company is also figuring on putting in automatic block signals between Toronto and Niagara Falls, said to be the busiest section of track in Canada. Extensions are also planned to the telephone train despatching service, present expectations being to add some 250 or 300 miles of wire between Toronto and Sarnia, and completing the service on the northern division, half of which was inaugurated last year. The plans also include putting in rock ballast on the line between Montreal and Toronto.

The Ontario Good Roads Association

Representative Gathering at Annual Meeting in Toronto—Instructive Addresses by well known experts Importance of Organization—Resolutions Adopted

The annual meeting of the Ontario Good Roads Association was held in Toronto on March 1st, 2nd and 3rd. The attendance was large, about 500 representatives being present from the various towns, townships and counties of the province.

The opening session on March 1st. was devoted to the appointment of committees and preliminary business of the association. J. F. Beam, of Black Creek, read a paper describing briefly the good roads movement in Ontario and advocating the appointment of a highway board for the province, similar to the Hydro-Electric Commission.

At the afternoon session on Wednesday, the progress in road construction was reviewed by the president, Mr. W. A. McLean, Provincial Engineer of Highways, followed in an address in which the principles of road organization in England, France, Germany and various of the States were described. The importance of organization was emphasized, and to this end every municipality should place their road work in charge of one superintendent. Mr. T. E. Kennedy read a paper on road management, and Mr. C. R. Young, C.E., of Toronto, discussed the construction of highway bridges from the investment point of view.

At the Thursday morning session Mr. L. J. Street, C.E., of Toronto, discussed shop fabrication and erection of highway bridges. This was accompanied by a series of interesting samples of defective work. Mr. M. M. Macwell, secretary of the Ohio Good Roads Association, described the work carried on in that state and urged that greater system be applied to all road work. Mr. H. J. Bowman, C.E., of Berlin, read a paper, "County Roads; Reasons for and Against," which was the result of replies received from various counties as to why they had not undertaken a system of county roads. The reason given in the majority of cases was "lack of funds."

At the afternoon session on Thursday, Mr. G. C. Diehl, Engineer of Erie County, Buffalo, reviewed the highway system of that state, under which fifty million dollars have been appropriated for state road construction. Mr. R. H. Jupp, County Engineer of Simcoe, read a paper on the cost of haulage, contrasting the excessive cost of teaming over the wagon roads with the present scale of railway rates. These were followed by addresses by Messrs. E. M. Young, Prince Edward County; W. R. Cummings, Carleton County; John A. Sanderson, Warden, Leeds and Grenville; Geo. M. Fox, Warden of Wellington County; W. B. Russ, Lincoln County; J. L. Taylor, Wentworth County, and others, with respect to the advantages of county road systems.

On Friday morning, Mr. H. S. Carpenter, Superintendent of Highways, Saskatchewan, addressed the convention on the progress made in the prairie provinces under pioneer road building. Township road improvement was dealt with by Mr. R. W. Longmore, reeve of Ernestown; Wm. B. Bridgman, reeve of Saltfleet, and F. H. Lowery, reeve of Niagara township. The advanced system in each of these townships was described.

The officers elected were: Honorary president, W. H. Pugsley, Richmond Hill; president, T. L. Kennedy, Dixie; first vice-president, A. M. Rankin, Collins Bay; secretary-treasurer, J. Farewell, K.C., Whitby; assistant secretary, W. A. McLean, C.E., Toronto.

The resolutions adopted at the meeting are given below, owing to pressure of space we are compelled to withhold a number of valuable papers. These will be given in later issues.

Report of Committee on Resolutions.

Whereas it is the opinion of the Ontario Good Roads Association that progressive legislation is urgently necessary to meet the growing demand and need for good roads in the province of Ontario, be it therefore resolved that the following measures be recommended to the government of this province for consideration:

First—That the present provision for provincial co-operation in the building of county roads be extended to provide provincial co-operation in the maintenance of such roads after construction, and that to obtain a revenue for this purpose a tax of 50 cents per horse-power be levied upon motor vehicles.

Second—That the proportion of provincial expenditure on county roads be increased from one-third to one-half in the case of roads built according to a standard to be fixed by the provincial department of public works.

Third—That the provision of the Highway Improvement Act be extended to townships in counties in which county road systems have been established under the act.

Fourth—That a system of provincial highways be assumed and built by the province.

Fifth—That this association do hereby endorse the steps already taken toward the establishment of provincial stone quarries for road purposes in connection with the provincial prison farm at Guelph.

Sixth—And whereas certain counties have made application for the diversion to drainage of funds set apart for roads under The Highway Improvement Act, be it further resovled that the opinion of this association be restated in accordance with the resolution of last year as follows:

Whereas the object of the Highway Improvement Act is to encourage road construction, not to distribute a provincial surplus:

And whereas land drainage is of local value and good roads general benefit to the province:

Be it resolved that, while the Ontario Good Roads Association does not oppose additional provincial aid to drainage, this association is nevertheless strongly opposed to legislative action such as will prevent any future council of these or other counties completing the highway system of the province; such as will divide councils upon the relative desirability of drainage and good roads; or will in any way impair the future usefulness of the act to aid in the improvement of public highways.

Seventh—That the Dominion government be asked to establish a Bureau of Highways along the lines of the office of public roads in connection with the United States Department of Agriculture.

Eighth—That in the opinion of the Association a Highway Commission should be appointed for this province.

Ninth—Be it further resolved that the secretary be hereby instructed to forward copies of these resolutions to the Premier, Sir James Whitney; to the Hon. Dr. Reaume, Minister of Public Works; and to each member of the Legislature of Ontario.

J. E. FAREWELL, K.C.,
Secretary,
Whitby.

T. L. KENNEDY,
President,
Dixie, P.O

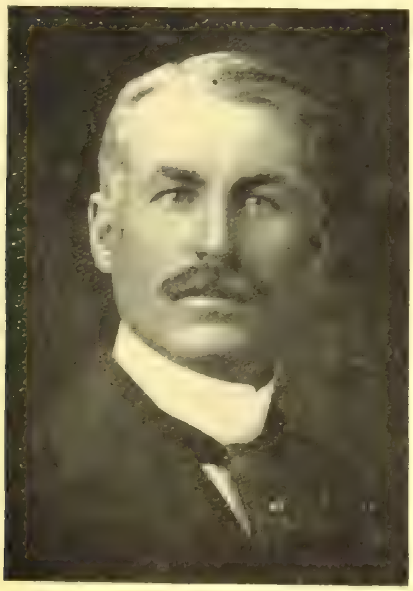
Canadian City Engineers

Angus Smith, Victoria, B.C.

Mr. Angus Smith, city engineer of Victoria, B.C., was born in Kent County, Ont., on August 31st, 1868. After graduating from the Collegiate Institute at Ridgetown, Ont., he entered the School of Practical Science, now the Department of Applied Science, University of Toronto, taking the full course in civil engineering, and graduated in May, 1894. Mr. Smith was commissioned a provincial land surveyor for Ontario in 1896, and is a member of the Canadian Society of Civil Engineers.

During the vacation of 1893 he was engaged as assistant engineer on the construction of a waterworks system for Dolgeville, N.Y., and after graduating in 1894 was assistant on the Penn Yan, N.Y., waterworks system, upon which he prepared an interesting paper for the Canadian Society of Civil Engineers. During the next five years, until 1900, he engaged in private practice as a civil engineer and surveyor at his home town, Ridgetown, Ont., where he soon made a reputation as a drainage engineer throughout Western Ontario.

From 1900 to 1906 he was engaged as city engineer of Stratford, Ont., during which time the city began and carried out its extensive paving programme, sewage disposal plant, trunk sewer, development of its water supply and many other important works.


Mr. Angus Smith, City Engineer of Victoria

In 1906 he went west to Regina, Sask., and has had the pleasure of seeing its municipal condition change from that of a town to the proportions of a city. The works carried out there under his supervision amounted to over $1,000,000. While in the prairie country, Mr. Smith superintended the installation of a complete waterworks system for Francis, Sask., and advised the city of Moose Jaw, Sask., in connection with its proposed paving plans, street railway undertaking, and the development of its water supply.

In March, 1910, Mr. Smith went farther west to Victoria, where as city engineer he has the supervision of all public works. Last year Victoria made a record in municipal improvements. The city has a municipal wood block creosoting plant and is undertaking the construction of the Dallas road sea wall and groynes for foreshore protection.

In the various cities in which he has been engaged, Mr. Smith has been instrumental in initiating the most up-to-date engineering ideas. He is considered by the profession to possess the characteristics that will make him one of the foremost engineers of the west.

Personal News and Notes

Mr. W. J. Laughlin, contractor, Chilliwack, B.C., has been appointed building inspector for that city.

Messrs. T. Aird Murray and J. G. Sing, of Toronto, and J. Randolph, Chicago, have been appointed a commission to investigate and report upon the Toronto water supply.

Messrs. Purdy, Leach and G. S. Andrews have been appointed to work in conjunction with Building Inspector Jarrett, of Vancouver, to revise the building by-laws of the city.

City Engineer Clement, of Vancouver, has tendered his resignation, to take effect March 31st. He has occupied the position for five years. Mr. Fellowes, of Westmount, Que., who has been appointed supervising engineer, assumes his duties on May 1st.

Mr. F. T. Wilson, resident engineer for the C. P. R. at Vancouver, has resigned his post in order to engage in private practice in that city. Mr. Thos. Lees, resident engineer at Brandon, Man., will succeed him at Vancouver, while Mr. V. J. Melsted, Winnipeg, will succeed Mr. Lees as resident engineer at Brandon.

The late Mr. John Carrere, the prominent New York architect, was a member of the firm of Carrere, Hastings & Bird, the designers of the new Bank of Toronto building at the corner of King and Bay streets, Toronto. The deceased architect was 53 years of age. His death was occasioned by injuries received in a taxi-cab accident.

Mr. Kennedy Stinson, of Montreal, informed us at the Cement Show last week that Mr. Wm. Van Horne, of the C. P. R., had just purchased the patent rights for manufacturing the Pauly concrete hollow tile in Cuba. A large plant will be erected and several thousand homes constructed of the material manufactured therein. Mr. Stinson has the Canadian agency for Pauly tile.

Mr. L. R. Voligny, Dominion Government Engineer, now in Edmonton with a party of surveyors, will continue the preliminary surveys of the Saskatchewan river from Fort Pitt to Lake Winnipeg. He states that the Dominion Government will be in a position at the close of 1911 to commence actual construction work on the project of making the river navigable from Edmonton to Lake Winnipeg. If the project is undertaken it will take several years to carry it to completion.

Master Painters' Convention

At the third annual convention of the Master Painters and Decorators of Western Canada, held recently in Winnipeg, Mr. W. R. Talbot, Winnipeg, was elected president; Mr. A. Malcolm, Hamiota, vice-president, and Mr. Wm. C. Clark, Winnipeg, secretary-treasurer.

Vacancies on the executive committee were filled by Frank Baxter, Winnipeg; J. E. Crane, Brandon; A. J. Hunt, Dauphin. Organizers, A. J. Sloan, Winnipeg, for Manitoba; D. C. Andrews, Saskatoon, for Saskatchewan; A. Desilets, Edmonton, for Alberta; B. H. Short, Cranbrook, for British Columbia; W. A. Longley, Kenora, for Ontario.

The next annual meeting will be held in Winnipeg.

The annual meeting of the Dominion Land Surveyors' Association was held at the Carnegie Library, Ottawa, March 7th and 8th, under the presidency of Mr. Thos. Fawcett.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Battleford, Sask.
A waterworks system will be installed this spring. Estimated cost, $100,000. H. C. Adams, secretary-treasurer.

Berlin, Ont.
The council will call for tenders for the paving of King street very shortly.

Brantford, Ont.
Tenders will be called shortly for the paving of Market street between Colborne and Erie avenue.

Calgary, Alta.
Tenders addressed to W. D. Spence, city clerk, will be received until March 15th for the construction of curb and gutter on the various streets along the boulevards.

Tenders are called by City Commissioners until March 24th for supply of vitrified sewer pipe and conduits. Specifications obtained from the above or from city engineer. W. D. Spence, city clerk.

Coldstream, B.C.
Tenders addressed to Jas. C. Kennedy, C.E., 413 Pacific Building, Vancouver, will be received until March 15 for special castings and stop valves for the municipal domestic waterworks. Specifications at offices of the above. E. Henderson, C.M.C.

Compton, Que.
A meeting of ratepayers will be held on the 1st of May to discuss the building of permanent roads in the township of Compton.

Cranbrook, B.C.
The ratepayers defeated the by-law to raise $100,000 for sewerage purposes.

Guelph, Ont.
Tenders are called until March 30th for construction of about 26,000 square yards of pavement, etc. T. J. Moore, city clerk; J. Hutcheon, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

London, Ont.
Tenders are called until March 30th for supply of steam road roller and crushed stone for the county of Middlesex. Charles Talbot, county engineer; T. C. Robson, county clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Medicine Hat, Alta.
The city council has passed by-laws to provide for the following street improvements: Concrete sidewalks, $83,500; curbs and gutters, $17,500; sidewalks, $5,500; sewers, $51,500.

Melville, Sask.
J. L. White, of Sioux City, S.D., is in charge of the installation of a water system here. L. Benoit, Melville, is interested.

New Liskeard, Ont.
Tenders are called until March 20th for pumps and motors in duplicate with connections for sewage outfall works. Plans, etc., on application to C. H. Fullerton, town engineer. P. Craven, clerk.

New Westminster, B.C.
City Engineer Blackman in his report dealing with permanent improvement to roads, etc., estimated the cost of drainage necessary for some streets at $3,507 per mile; cost of storm sewers at $7,000 per mile; road and curb and gutters, $5,280. The cost of grading for an average road at $3,520 per mile. Estimated cost of metalling, allowing for metal saved from existing roads, $14,080 per mile.

North Vancouver, B.C.
Tenders were called until March 13th for supplying material and constructing storm sewer on five streets. Geo. S. Hanes, city engineer.

Ottawa, Ont.
Sparks street will be repaved by day labor, at an estimated cost of $25,000. City Engineer N. J. Ker.

The city of Ottawa was given power by the legislature to spend $400,000, of which $300,000 is for new sewage works, without submitting by-laws to the people.

Prince Albert, Sask.
Tenders are called until April 15th for construction of main intercepting sewer, etc., by City Commissioners A. Holmes, C. O. Davidson and F. A. Creighton. Advertisement in "Tenders and For Sale Department" of this issue.

Rosthern, Sask.
A survey preliminary to the securing of estimates will be made for the installation of a waterworks and sewage system. Government Engineer, Mr. Murray, Regina, will make the estimates.

Saskatoon, Sask.
Tenders addressed to W. B. Neil, city commissioner, and James Clinkskill, mayor, will be received until April 14th for the following— contract number 78, pipe laying; number 79, furnishing concrete sewer pipe; 80, furnishing c.i. sewer pipe and specials. Tenders are also called until March 31st for installation of a mechanical water filtration plant for the city.

Sault Ste. Marie, Ont.
Tenders are called until March 20th for construction of cement concrete sidewalks, etc. W. H. Munro, mayor; W. F. Grant, C.E., town engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Scotstown, Que.
The citizens are considering the installation of a water and sewerage system to cost about $40,000. A. Dufresne, engineer, Sherbrooke, has prepared plans.

Toronto, Ont.
City Engineer Rust recommends that Bloor street be widened from 66 to 86 feet between Dundas street and High Park avenue. Cost, $132,000.

Tenders addressed to the chairman of the board of control will be received until March 28th for steel extensions for manholes on 6-ft. steel pipe line. G. R. Geary, mayor.

Vancouver, B.C.
For the purpose of completing the sewerage system of the city the council will ask the executive for the right to submit a by-law at the forthcoming election asking authorization to float a loan for sewer purposes and surface drainage of $300,000. Of this sum the council estimates, on the opinion of the city engineer, that $250,000 is now needed to complete the sewer system, while $50,000 will provide surface drains.

Verdun, Que.
The purchase of the necessary materials to make the necessary repairs to the streets and sidewalks has been authorized by council.

AWARDED

Lethbridge, Alta.
The Lethbridge Iron Works got the contract for supplying manhole covers at $3.20 per 100 lbs. The price was 10c. a cwt. higher than the Canadian Iron Corporation, but as they delivered them to any part of the city they were given the contract, the difference on the whole contract of $898.56 being only $28.08.

Railroads, Bridges and Wharves

Brantford, Ont.
Tenders addressed to J. A. Smith, tp. clerk, will be received until April 3rd for construction of four concrete bridges for the township of Brantford. Advertisement in "Tenders and For Sale Department" of this issue.

Calgary, Alta.
The location of the G. T. P. Railway's proposed bridge over the Bow has been approved.

Crediton, Ont.
Tenders addressed to Henry Eilber, clerk township Stephen, will be received until April 3rd for construction of cement abutments and floor of bridge across the Aux Sable river, etc. Plans, etc., at office of the above.

Chateauguay, Que.
Tenders for construction of wharf here have been called until April 4th by Public Works Department, Ottawa. Plans, etc., at this Department, at the office of J. L. Michaud, Esq., District Engineer, Merchants Bank Building, St. James street, Montreal, and on application to the local postmaster.

Fork River, Man.
Tenders are called until March 18th for construction of a Howe truss bridge, 83 ft. span, across the Fork river. Plans, etc., at office of Public Works Department, Winnipeg, and D. F. Wilson, sec-

retary-treasurer, Massey River Mun., Fork River.

Guelph, Ont.

The erection of a new bridge on Neeve street has been recommended. J. T. Hutcheon, city engineer.

Lambton Mills, Ont.

The C. P. R. plans to build a spur line from a point west of the Humber river to the village of Emery, connecting there with the North Bay-Sudbury line. The survey has been laid out.

London, Ont.

Tenders are called until March 25th for construction of 22 stall engine house with machine shops. A. L. Hertzberg, division engineer, Toronto. Supt. McNeillie; T. Murphy, Montreal, general superintendent of transportation.

Owen Sound, Ont.

Tenders are called until April 7th for material, etc., in connection with two bridges, steel superstructure, concrete abutment, etc., for this municipality. J. K. Leslie, chairman of works; R. McDowall, C.E., town engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Strathmore, Alta.

The C. P. R. management has decided to provide very complete operation headquarters here, it being the intention to erect a large administration building, as well as residences for various employees, and a mess hall. This work will be proceeded with at once, at a cost of about $25,000. C. W. Peterson, superintendent of irrigation.

Toronto, Ont.

The Board of Control have decided to advertise for tenders for the construction of new docks at Ashbridge's Bay. City Engineer Rust submitted plans and specifications for the work, which were approved. Estimated cost, $135,000.

AWARDED

Edmonton, Alta.

A sub-contract for forty miles of the Canadian Northern, west of the Pembina river, on the contract for 200 miles, held by the Cowan Construction Company, has been awarded by Chas. J. Merry, to Jas. O'Connor, former subcontractor on the Grand Trunk Pacific. Work is to be commenced at as early a date as possible.

Sherbrooke, Que.

The contract for the construction of the reinforced concrete free bridge between St. Johns and Iberville, has been awarded to Messrs. F. Lemoine & Son, of Montreal, for the sum of $154,000. The contractors have agreed to take from the two municipalities the old iron bridge bought from the county of Monogahela, Pittsburg, Pa., shipped last fall to St. Johns.

Winnipeg, Man.

The C. P. R. construction department have awarded contracts for grading, concrete, culvert and bridging on new branch lines and second track on main line for 344 miles of work in the west as follows: To Foley, Welch and Stewart, two lines out of Swift Current, 80 miles, one line out of Moose Jaw, 35 miles, one line east from Lacombe, 60 miles. To W. A. Dutton, three branches out of Wilkie, 82 miles. To Janse, Macdonald and Company, two lines in British Columbia, 54 miles. To J. G. Hargrave, second track from Moose Jaw west, 23 miles, east from Moose Jaw, 10 miles.

Public Buildings, Churches Schools, etc.

Aylmer, Ont.

The ratepayers will vote on a debenture by-law to loan $4,000 for remodelling the town hall. D. C. Davis, clerk.

Amherst, N.S.

Competitive plans are invited until March 31st for a 12-room school of brick with stone or cement trimmings, to be heated by low pressure steam, at a cost of not over $35,000. Architect submitting successful plans will have the inspection if satisfactory arrangements can be made with council. W. Fred Donkin, town clerk.

Berlin, Ont.

Mr. Moogk has been instructed to prepare a plan for isolation hospital providing for extra storey.

Burnaby, B.C.

The design of Messrs. Somerville & Putnam, architects, of Vancouver, for the new municipal hall, has been provisionally accepted. Estimated cost, $26,220.

Brandon, Man.

Plans for the new hospital are nearly completed. Tenders will be asked at once. Time for receiving them will be short as the building must be completed this year if possible. Capt. Donnelly is in charge of preliminary work. T. Hooper, provincial architect.

Battleford, Sask.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, Ottawa, will be received until April 4th for construction of hot water heating apparatus in new public building here. Plans obtained on application to Mr. F. B. Latimer, architect, Battleford, Sask., and at the Department of Public Works, Ottawa.

Carleton Place, Ont.

Tenders addressed to W. H. Allen, secretary, will be received until March 20th for erection of Zion Presbyterian Church. Plans, etc., at office of above and at office of the architect, J. A. Ewart, Sparks Chambers, Ottawa.

Cedar Cottage, B.C.

The Roman Catholics will erect a new church here.

Chatham, Ont.

Tenders addressed to Jas. L. Wilson & Son, architects, will be received until March 18th for erection of concrete, cut stone and brick church; also for a rectory of similar construction to be built at Pain Court. Plans, etc., at office of architects.

The public school board decided to have a new public school this year. Inspector Smith. Capt. J. S. Black is interested.

Chelmsford, Ont.

Tenders addressed to Rev. Father S. Cote, will be received until April 1st for the basement of stone church to be built here. Plans, etc., at office of the North Bay Times.

Calgary, Alta.

The Fourteenth Avenue Methodist Church will be rebuilt at a cost of $55,000. Rev. C. W. Bishop, pastor.

An option of four lots at the corner of Sixth avenue and First street east has been secured for the erection of new fire hall.

The Calgary Golf & Country Club will erect their new club house this year.

Cobalt, Ont.

Tenders addressed to R. P. Courbon will be received until March 15th for erection of Roman Catholic College at North Cobalt, Ont. Plans, etc., at offices of the architects, Moran & McPhail, architects, Haileybury, Ont.

Fort Frances, Ont.

In the recent plebiscite taken in regard to new school, the ratepayers voted in favor. Mr. Bruce Lyod, secretary-treasurer, public school board.

Fredericton, N.B.

Tenders addressed to A. H. F. Randolph, president board of hospital trustees, will be received until March 21st for labor and materials required in improvement, etc., of the contagious wing of the Victoria Public Hospital here Plans, etc., at office of above.

Grand Valley, Ont.

Mr. Gray, of Harriston, has been instructed to prepare plans for the library building, which will be sent to Mr. Carnegie for his approval. Estimated cost, $6,000, including heating.

Goderich, Ont.

The council is calling for competitive plans for the proposed new municipal buildings here. L. L. Knox, town clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Galt, Ont.

The $25,000 by-law for hospital improvements will go to the ratepayers on April 8th.

Hamilton, Ont.

The Board of Education have decided to ask permission to issue debentures for $150,000 for a twenty-room school on Sherman avenue. The building committee was empowered to invite tenders. F. J. Howell, acting chairman.

Kingston, Ont.

A by-law will be voted on to raise $40,000 for school purposes. W. Sands, city clerk.

Little Bras d'Or, N.S.

Work will be commenced on a $20,000 church for the Roman Catholic congregation here. Rev. Father McIntosh, chairman of building committee.

Merritt, B.C.

Plans for erection of municipal hospital will be prepared soon.

Moose Jaw, Sask.

Tenders for erection of brick veneer church at Wesley are called until March 17th by W. H. Beesley, Box 1028, this city. Architect, Mr. Zimmerman, Moose Jaw

The public school trustees are calling for competitive plans for two fireproof schools of 12 and 8 rooms, until April 1st. Premiums of $100 and $75 respectively will be given for plans submitted. Clifford Kempton, secretary, treasurer.

Merritt, B.C.

It is likely that a new school will be erected here shortly. School Inspector Pollick.

Maisonneuve, Que.

Plans are being prepared by C. A. Reeves, architect, Montreal, for the post office here. Plans call for a building 3-storeys high of dressed Montreal limestone on reinforced concrete foundations with frontage of eighty feet by depth of 100 feet. Estimated cost, $60,000.

Ottawa, Ont.
Plans are being prepared for a new theatre on Sparks street for Mr. B. F. Stapleton, 546½ King Edward avenue.

Competitive plans are being submitted for the new Congregational church and it is expected that the architect for the new structure will be chosen very soon.

Owen Sound, Ont.
The public school board have under consideration the erection of a new school. Dr. Howey, chairman of special committee.

Paris, Ont.
Tenders for erection of school in S. S. No. 13, Brant County, addressed to Robert McCormack, secretary, Paris, will be received until March 18th. Plans, etc., at office of Taylor & Taylor, architects, Hope Chambers, Brantford.

Pembroke, Ont.
The council have chosen the Moffat site for the new Carnegie library. Plans, etc., have been approved and it is thought work will be commenced at once.

Portage la Prairie, Man.
Tenders addressed to R. C. Desrochers, Secretary, Department of Public Works, Ottawa, will be received until April 3rd for erection of public building here. Plans, etc., at this department, on application to Mr. J. E. Cyr, Superintendent of Public Buildings for Manitoba, post office building, Winnipeg, and at the local post office.

Regina, Sask.
The members of St. Paul's church have decided to erect a parish hall to cost about $12,000.

Tenders are called until March 24th for erection of new church on Victoria avenue for First Baptist Church. H. A. Couse, secretary building committee.

Royal Oak, B.C.
Tenders for erection of municipal building for South Saanich were called until March 13th. J. C. M. Keith, architect.

Saskatoon, Sask.

Preliminary sketches for a civic building were submitted to council. They call for a building about 110 x 160 feet, of brick and stone.

The public school board at a recent meeting decided on the erection of three new schools of eight rooms each, capable of enlargement, at a cost of $160,000, the purchase of three new sites costing $8,000, and improvements to existing schools. A by-law was ready to raise $200,000 on debentures to pay for the same.

Simcoe, Ont.
Tenders are called until March 31st for erection of public library here. Advertisement in "Tenders and For Sale Department" of this issue.

St. John, N.B.
Tenders addressed to H. H. Nott, architect, will be received until March 16th for repairing and heating the building, corner of Union street and Hazen avenue for the Board of School Trustees.

St. Thomas, Ont.
The board of education have instructed architect John Findlay to prepare plans, etc., for the proposed addition to the Scott street school.

Strathcona, Alta.
A new theatre on Whyte avenue to replace the Bijou will be erected in the spring. Manager McKerman of the Bijou, is interested.

Sydney, N.S.
Messrs. Butler & MacDonald have completed plans for the new Presbyterian Church at Gabarus, to replace the one burned recently.

Tilbury, East, Ont.
Tenders addressed to Jas. L. Wilson, architects, Chatham, will be received until March 25th for all trades required in erection of new brick school in S. S. No. 3 near Fletcher Station. Plans, etc., with David Fletcher, and at office of the above. J. J. Irwin, J. A. Williams and Geo. Holmes, trustees, Tilbury, East.

Toronto, Ont.
Plans for the new No. 3 Police Station, Claremont street, have been approved. Work will be commenced in the summer.

The property committee recommended that tenders be called at once for the construction of a seventeen-room school on Caledonia road.

Vancouver, B.C.
The Lester School of Music will erect an academy, etc., near Burrard at a cost of about $60,000.

The Strathcona Institute and Seaman's Institute have amalgamated and have appointed a joint committee to report on a building for both societies. Mr. John T. Stevens, chairman of house committee.

The rough plans for the new armory here have been sent to Ottawa for approval with a petition for the building to be erected. Col. Fiset, deputy minister of militia, Ottawa. Estimated cost, $1,000,000.

Victoria, B.C.
The provincial department of public works is calling for tenders for 1,500 school desks and 240 single rears, to be delivered here or in Vancouver before May 14. Tenders have to be in by March 22.

Welland, Ont.
As soon as arrangements can be completed, the Sons of England will erect a large lodge and office building.

The Salvation Army have purchased land and will erect a barracks to cost about $10,000.

The council voted $22,000 for the new school. H. A. Sidey, chairman of public school board; inspector Marshall.

The public school board are calling for competitive plans for proposed new 8-roomed school until April 1st. Estimated cost about $20,000. J. McCaw, secretary, public school board.

Winnipeg, Man.
Tenders will be called shortly for the Y. M. C. A. building. Cost, about $275,000. Mr. Patton, secretary.

It is expected that the contract for dormitory in connection with the new Agricultural College will be let soon. Estimated cost, $500,000; also the contract for heating plant, which is figured to cost about $60,000. Hon. R. Rogers, minister of public works.

Winnipeg Beach, Man.
Tenders addressed to J. D. Forster, secretary-treasurer, will be received until March 20th for erection of municipal hall here. Plans, etc., at office of the clerk.

West Toronto, Ont.
The trustees of S. S. No. 29 have been instructed to purchase the property on the northeast corner of Herbert street and St. John's road, as a building site for the new school. Mr. Clouston, chairman.

AWARDED

Carleton Place, Ont.
David Moffatt, of Carleton Place, has been awarded the contract for the erection of the Masonic temple.

Chilliwack, B.C.
C. L. Street has obtained the contract for the erection of the new hospital here.

Calgary, Alta.
The contract for the St. John's church in East Calgary has been let to Messrs. Zank and Musgrave, $14,000. Messrs. Lang and Major, architects.

Fort William, Ont.
The Northern Engineering Company have the erection of the fireproof theatre this season at a cost of about $60,000. W. J. Ross, M. C. Worth, architect.

The library board accepted the tender of M. H. Braden for about $36,000 for erection of library. The building is to be of pressed brick and stone.

Nanaimo, B.C.
Jeffrey Planta has been awarded the contract of building a convent on Wallace street, $25,000.

Quebec, Que.
Emile Dube, Fraserville, Que., and Joseph Goselin, Levis, Que., have been awarded the contract for restoration of the customs house here, $135,369.

Strassburg, Sask.
Storey & Van Egmond, architects, Regina, have awarded to Thomas James the contract for the new brick school building here.

Warren, Man.
M. S. Peacock, Warren, has been awarded the contract for erection of consolidated school here, $8,100. Ralph Smith, Winnipeg, architect.

Winnipeg, Man.
H. Bruce and A. Bostrom were awarded the contract for the construction of the public baths at a cost of $44,880.

The contract for the new club house for the St. Charles Country Club was awarded to Claydon Bros. The building will be 140 feet in length by 70 feet in width. The contract calls for completion by September 1, 1911.

Residences

Brantford, Ont.
Tenders addressed to D. W. B. Lins- will be received until March 25th fo erection of residence. Plans, etc., at 321 Colborne street. Geo. W. Hall, architect.

Calgary, Alta.
Building permits were granted to William Jamieson for new residence i Mount Royal, $14,000, also to Consolidated Estate and Building Company fo the erection of five new houses, the cos per house estimated at $2,000.

Chatham, Ont.

Tenders addressed to W. McNeilage, Lot 11, Con. 5, Chatham Tp., will be received until March 18th for erection of residence near Darrell Station, P. M. Ry. James L. Wilson & Son, Board of Trade Building, Chatham, architects.

Ottawa, Ont.

Messrs. Nimmo and Soper contemplate constructing twelve new houses on the Glebe very shortly.

Wolf Shenkman is preparing to erect two tenement houses and an apartment house on Sandy Hill.

A large 4-storey block will be erected by Mr. Donald Fraser, contractor, on the corner of Albert street and O'Connor. Cost, $95,000.

Plans are being prepared by Horwood, Taylor and Horwood, architects, for an apartment house on Cooper street for J. A. Seybold.

A local investor through D. J. McA'Nulty has purchased property 100 feet square on the corner of Daly avenue and Fried and will erect a large apartment house on it.

Regina, Sask.

Tenders will be received until March 16th for erection of house for J. W. Thomas, Esq., also for house for S. Young, Esq. Architects, Storey & Van Egmond.

Victoria, B.C.

Plans for a handsome new house have been completed by W. D'O Rochfort, for Mrs. Pigott.

Messrs. Dinsdale & Malcolm, contractors, will erect on the corner of Field and Douglas streets a new apartment house to cost about $20,000.

Business Buildings and Industrial Plants

Calgary, Alta.

The plans for the new C. P. R. colonization building are nearing completion. It is understood that the building will cost in the neighborhood of $80,000, and will be three or four stories high.

Campbellton, N.B.

Tenders addressed to A. W. Campbell, chairman government railways managing board, will be received until March 25th for construction of brick and stone passenger station here. Plans, etc., at office of local agent, I. C. R., at office of chief engineer, Moncton, and with the secretary of the department of railways and canals, Ottawa.

St. John, N.B.

Edmonton, Alta.

Tenders are called until March 15th for erection of 6-storey brick and stone building for Mr. R. Telger on First street. H. A. Magoon, architect.

Plans are being prepared by Barnes & Gillies, Edmonton, Alta., for a wholesale and office building to cost about $160,000. Adams Bros., Winnipeg, are interested.

Field, B.C.

The C. P. R. will erect a new station here.

Golden, B.C.

Tenders are invited by the C. P. R. management for the erection of six chalets of Swiss design at the Swiss village "Edelweiss" near here. Plans, etc., on application to J. S. Dennis, manager, Irrigation Alberta and B. C. Lands, C. P. R. Co., Calgary, Alta.

Grand Valley, Ont.

Wm. McIntyre will erect on corner of Main and Miller streets a building of pressed brick, two storeys high. It is stated that the Traders Bank will occupy it.

Halifax, N.S.

The Railway Commission and the Halifax Board of Trade discussed plans for a new terminal. Mr. Kennedy, engineer of Montreal Harbor, presented the plans he had prepared, which were approved with minor changes. The plans propose the complete removal of the present wooden wharves, and their replacement by immense concrete structures. Mr. Campbell, chairman of the railway board, stated that the board would recommend to parliament that the terminals, as per Mr. Kennedy's plans, be slightly modified to meet Halifax requirements be built. He estimates that the total cost would be from one million and a half to two million dollars.

Hamilton, Ont.

It is rumored that the Grand Trunk are trying to secure a block of land on Ferguson avenue for a new station.

Lachine, Que.

Mr. C. Manuel, Montreal, representing an English syndicate, has just concluded arrangements for the erection of a large automobile factory here.

Lethbridge, Alta.

Tenders addressed to W. T. Williams, were received until March 11th for erection of brick business block on site of Balmoral hotel for the executors of the Wm. Henderson Estate. Plans, etc., at office of the above.

London, Ont.

Tenders are called until March 15th for erection of store on Dundas street. Plans, etc., with John Lightfoot, 698 Dundas street.

Medicine Hat, Alta.

The Medicine Hat Milling Co. will erect another flour mill here, it is stated.

Moose Jaw, Sask.

The application of Willoughby, Pickett and Craig for building lots was granted. Noted in issue of March 1st.

Ottawa, Ont.

J. Y. Caldwell will erect a building with stores and apartments on Wellington street.

A brick fireproof building, 4 storeys, will be erected on Sparks street for Messrs. Munroe & Shaver. Plans are being prepared.

A company is being organized as a branch of a Detroit automobile concern, which will take over the Watson Carriage Company's plant and enlarge it.

C. Cambie, local manager of the Bank of Commerce, has confirmed the report that the bank has purchased a lot with 66 feet frontage on Sparks street and will have plans prepared at once for erecting a bank building.

C. P. Meredith is preparing plans for erecting a two-storey brick addition to a commercial building on Sparks street, formerly occupied by Maxwell Harris Cimpany. The building is to be constructed for Hugh Carson.

Regina, Sask.

Credit Foncier F. C. will this year erect a modern office building.

Henry Black will erect another business block on Hamilton street.

Saskatoon, Sask.

Brown & Vallance, architects, Winnipeg and Saskatoon, are preparing plans for a 5-storey office building(50 x 100 ft.) for Dr. P. D. Stewart, to cost $70,000.

Toronto, Ont.

Tenders were called until March 13th for excavation, drainage, gas plumbing, etc., required in erection of new plant for Canada Metal Co., Ltd., on Fraser avenue. Plans with F. H. Herbert, architect, 65 Adelaide street east.

Tenders addressed to Darling & Pearson, architects, will be received until March 22nd for the various trades required in erection of Garage on Sussex avenue. Plans, etc., at office of the above.

Darling & Pearson, architects, 2 Leader Lane, are calling for tenders for clearing numbers 1, 3 and 5 southeast corner King and Yonge streets, the site on which the new C. P. R. offices are to be erected.

Windsor, Ont.

The D. M. Ferry Seed Co. will rebuild their plant here, recently destroyed by fire. It will be of reinforced concrete and three storeys high.

Winnipeg, Man.

It is reported that J. F. L. Thomas has opened an office here as representative of Vickers, Sons & Maxim, of Sheffield, Eng., and that a plant will be erected here.

AWARDED

Chatham, Ont.

The Rowsley Spring & Axle Company have let a contract to the Blonde Manufacturing Company to build an extension to their present plant. Cost, $15,000.

Maisonneuve, Que.

While no official announcement has yet been made we learn from a reliable source that Mr. C. E. Deakin, the well-known building contractor has been awarded the contract for a new electric power house or sub-station here for the Shawinigan Light & Power Company, at an estimated cost of $100,000. Work will be started as soon as possible. The structure will be of reinforced concrete, 75 x 100 feet, and 3-storeys high.

Montreal, Que.

Mr. C. E. Deakin is the contractor for the reinforced concrete plant to be erected for Messrs. Ramsay & Son, near corner of St. Paul and Inspector streets. The structure will be six storeys high with 50 ft. frontage. Estimated cost, $30,000.

The Canadian Stewart Co., Limited, general contractors, have been awarded the contract for the power development and construction of pulp mills and paper mills for Messrs. Price Bros. & Co., of Quebec. The plant is to be erected at Jonquiere, Que, ten miles from Chicoutimi. It is understood that the plant will comprise about 20 buildings; estimated cost, over $2,000,000, exclusive of machinery. G. F. Hardy, architects and

(Continued on page 58)

Tenders and For Sale Department

For Sale — Second Hand

No. 8 Austin Gyratory Crusher.
No. 6 and No. 3 Austin complete plant.
No. 3 Austin and 2 No. 6 Gates and No. 5 "B."
70-ton Vulcan Steam Shovel, 2-yard.
30-ton Bucyrus Steam Shovel, 1¼-yard.
Loco. Crane, with 1¼-yard Clam Shell.
Little Giant Traction Steam Shovel, 1¼ yard.
Hayward Orange Peel Buckets, 1 and 1¼-yd.
Concrete Mixers, Steam Rollers, Air and Steam Drills, Air Compressors, Locomotives, Dump Cars, etc.

All our goods we fully guarantee.

Send for our February Booklet.

WILLIS SHAW MACHINERY CO.,
171 La Salle St.,
Chicago, Ill.

City of Moose Jaw, Sask.

Tenders for

Garbage Wagons, etc.

Sealed tenders, endorsed "Health Department," will be received by the undersigned City Clerk until 8.30 o'clock p.m., on **Monday, March 20th, 1911**, for the following apparatus:

Wagons made of steel or other material, and tanks suitably designed for conveying ashes, garbage and all materials collected and removed under the supervision of the Health Department.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.

Moose Jaw, March 1st, 1911 10-11

Temiskaming & Northern Ontario Railway Commission

Sealed tenders, addressed to the undersigned, will be received up to 12 o'clock noon, on Wednesday, March 22nd, 1911, for all works in connection with the construction of a passenger station at Matheson. Tenders to be marked on envelope—"Passenger Station at Matheson."

Plans and specifications may be seen at the office of the architect, J. M. Lyle, 14 Leader Lane, Toronto, or at the office of the Chief Engineer in North Bay.

Certified cheque on a chartered bank of Canada, payable to the order of the Secretary-Treasurer of the Commission, for ten per cent. of the amount of the tender, must accompany same.

Lowest, or any tender, not necessarily accepted.

A. J. McGEE, Sec.-Treas.,
25 Toronto street, Toronto.

Toronto, March 3rd, 1911.

Note—Papers inserting this advertisement without authority, will not be paid for same. 10-11

City of Moose Jaw, Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A" and "Tender B" will be received by the undersigned City Clerk until 8.30 o'clock p.m., on **Monday, April 10th, 1911.**

Any tender received after the above-stated time will be declared informal.

Contract "A."

Supplying material for and constructing a Sewage Disposal Plant complete, including Pump House, Sedimentation Tanks and Percolating Filter, also the supply of materials for and the laying of a Trunk Sewer and Water Main.

Contract "B."

Supplying two Electrically Driven Centrifugal Pumps and Auto Starters complete with all piping, connections, etc.

Plans and specifications for Contract "A" may be obtained from the City Engineer, Moose Jaw, upon receipt of a marked cheque for the sum of $25 to be held until the return of plans and specifications, and for Contract "B" plans and specifications will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.

Moose Jaw, Feb. 18th, 1911. 9-14

City of Moose Jaw, Saskatchewan

SEWER AND WATER EXTENSIONS

Sealed tenders endorsed "Tender 28," "Tender 29," "Tender 30" and "Tender 31," will be received by the undersigned City Clerk until 8.30 o'clock p.m. on **Monday, April 10th, 1911.**

Any tender received after the above stated time will be declared informal.

Contract 28.—The laying of approximately 30,700 lin. feet of tile pipe sewer, building manholes, etc.

The laying of approximately 29,700 lineal feet of cast iron water main, placing valves, valve boxes, hydrants, etc.

Contract 29.—The supplying of approximately:
29,600 lineal feet of 6-in. c.i. water pipe.
112 lineal feet of 4-in. c.i. water pipe.
132 6-in. cast iron reverse curves.
34 6-in.. cast iron crosses.
72 6-in. cast iron tees.
29 4-in. off 6-in. cast iron tees.
28 4-in. cast iron tees.
95 6-in. cast iron plugs.

Contract 30.—The supply of approximately:
28,000 lin. feet of 6-in. vitrified tile sewer pipe.
26,600 lin. feet of 8-in. vitrified tile sewer pipe
5,225 lin. ft. of 10-in. vitrified tile sewer pipe.
1,100 lin. ft. of 12-in. vitrified tile sewer pipe.
25 8-in. tees.
75 6-in. tees.
25 8-in. ¼ bends.
100 6-in. ⅛ bends.
25 8-in. stops.
25 10-in. stops.
400 4-in. to 6-in. increasers.

..Contract 31.—The supply of approximately:
65 6-in. 3-way hydrants.
147 6-in. gate valves.
29 4-in. gate valves.
150 6-in. valve boxes.
29 4-in. valve boxes.
88 manholes, frames and covers.

Plans and specifications for Contract 28 may be seen at the office of the City Engineer, Moose Jaw, and at the offices of the Canadian Engineer at Toronto and Winnipeg.

Plans and specifications for Contracts 29, 30, and 31 will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.

Moose Jaw, Feb. 24, 1911. 9-14

City of Guelph

Pavement Construction

Sealed tenders, addressed to the City Clerk, will be received up till noon on **Thursday, March 30th, 1911**, for the construction of approximately 26,000 square yards of pavement, with about 5,000 lineal feet of street railway track and approximately 13,000 lineal feet of combined curb and gutter.

Particulars may be obtained from the City Engineer.

A marked cheque for $1,000 must accompany each tender.

The lowest or any tender not necessarily accepted.

J. HUTCHEON, City Engineer.
T. J. MOORE, City Clerk.

Guelph, March 7, 1911. 11-11

City of Toronto

Civic Car Lines

Tenders for Rail & Ties

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, April 4th, 1911**, for delivery of Thirteen hundred and forty (1340) tons of open hearth steel rail, 80 lb. section, also thirty thousand (30,000) untreated wood ties, white cedar preferred, although other woods will be considered.

Envelopes containing tender must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained upon application to the office of the City Engineer, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor)
Chairman, Board of Control.

City Hall, Toronto, Feb. 23, 1911, 9-11

City of Brandon, Man.

March 2, 1911.

Sealed tenders, which must be endorsed "Tender for Supplies," will be received by the City Clerk, Brandon, Manitoba, until 12 o'clock at noon on **Friday, the 17th day of March, 1911**, for the following goods:—

Vitrified sewer pipe, 6-in., 8-in., 10-in., 12-in., 15-in., and junctions at price per foot f.o.b. Brandon, freight and duty paid (all breakages to be allowed for). In carload lots.

Cast iron manhole covers.
Cast iron catch basins and covers.

Water Works Supplies.

Brass Goods—
Corporation and curb cocks and specials.
Lead pipe.
pig lead.
Fire hydrants.
Valves, 4-in., 6-in., 8-in.
Valve casings.
Service boxes.

Specifications and further particulars can be obtained from the City Engineer's office.

All goods must be the best quality of their respective kinds.

The lowest or any tender not necessarily accepted.

R. E. SPEAKMAN,
City Engineer.

Brandon, March 2, 1911. 10-11

Tenders Wanted

For a Steam Road Roller, and crushed stone for County of Middlesex.

Sealed tenders will be received by either of the undersigned until noon on Thursday, March **30th, 1911**, for crushed stone delivered F.O.B. at the following stations on the Grand Trunk Railway, viz., Parkhill, Strathroy, Mt. Brydges, and Newbury; also F.O.B. at the following stations on the Canadian Pacific Railway, viz., Appin Junction, Caradoc, and Belmont. The contractor to quote prices for 2-in. and ½-in. stone, to be delivered in car lots as required, also at the same time tenders will be received for a ten-ton Steam Road Roller.

CHAS. TALBOT, T. E. ROBSON,
11-12 County Engineer. County Clerk.

Tenders Wanted

Sealed tenders marked "Tender for Bridges" and addressed to J. A. Smith, Esq., Clerk of Brantford Township, Ont., will be received up till noon on **Monday, April 3rd, 1911**, for the constructoin of four concrete bridges for the Municipality of the Township of Brantford.

Two of the bridges are plain concrete arches, and two are reinforced concrete girder bridges.

Plans and specifications may be seen at the office of the undersigned, Court House, Brantford.

The lowest or any tender not necessarily accepted.

JAMES A. SMITH,
11-12 Township Clerk.

Tenders for a Steel Bridge

City of Kingston

Tenders will be received by registered post only, by the municipal council of the City of Kingston, Ont., up to noon on **Wednesday, April 5th, 1911**, for the supply and erection in place of a Steel Truss Draw Bridge, one Concrete Pier and timber abutments, all on a grillage foundation. Channel between swing pier and abutment to be 80 feet. The bridge to be floored with three-inch plank floor on steel stringers. Specifications may be seen and all other information obtained at the office of the undersigned.

The lowest or any tender not necessarily accepted.

H. B. R. CRAIG,
City Engineer.
March 14th, 1911. 11-11

Town of Oshawa

Asphalt Block Pavement

Sealed tenders will be received up to and inculding **the 18th day of March, 1911**, for the construction of an Asphalt Block Pavement on a concrete base, together with cement concrete curb, gutter and widening of sidewalk where necessary upon the following streets:

King street, 1.750 lineal feet of width, varying from 30 to 40 feet.

Simcoe street, 1.650 lineal feet of width varying from 30 to 40 feet.

The part to be paved will include that portion of the road occupied by the track of the Oshawa Street Railway Company.

Plans may be seen and specifications obtained from the Town Engineer's Office, Town Hall, Oshawa.

The lowest or any tender not necessarily accepted.

W. E. N. SINCLAIR, B.A., LL.B.
Mayor.
FRANK CHAPPELL,
Town Engineer.
Oshawa, February 20, 1911. 11-11

Tenders Wanted

Sealed tenders addressed to the undersigned will be received up to noon of **31st March, 1911**, for all the various trades interested in the erection and completion of the new building for the Public Library in the Town of Simcoe, Ontario.

Drawings and specifications may be seen at the office of the Chairman of the Building Committee in Simcoe, and the Contract Record, 220 King street west, Toronto.

H. B. DONLY,
Chairman Building Committee,
11-12 Public Library Board.

To Architects

Competitive Plans

The Municipal Council of the Town of Goderich is desirous of obtaining plans for a proposed new municipal building (combined Town Hall and Fire Hall) to be erected on the site of the present Town Hall.

Conditions of competition can be had on application to the undersigned.

Plans will be received up to and including **April 15th, 1911.**

L. L. KNOX, Town Clerk,
11-13 Goderich, Ont.

Tenders Wanted

Bulk and separate tenders for all or any of the different branches required in the erection and completion of a

SCHOOL BUILDING,

to be erected in S. S. No. 13, Brant County, commonly known as Moyles, will be received up till 12 o'clock noon, on **Saturday, the eighteenth day of March, 1911.**

All tenders shall be marked "Tender" and addressed to Robert McCormack, Esq., Secretary of Trustee Board, Paris, Ont.

Plans and specifications may be seen at the office of Taylor and Taylor, architects, Hope Chambers, Brantford.

The lowest or any tender not necessarily accepted. 11-11

Bridge Tenders

Sealed tenders addressed to the Chairman, Board of Works, Owen Sound, will be received up till 6 p.m., **Friday, April 7th, 1911**, for the following:

1. **9th Street Bridge—**
   (a) Steel superstructure, span 53 ft., width 40 ft.
   (b) Reinforced concrete floor for same.
   (c) Concrete abutments for same.
   (d) Reinforced concrete arch, span 50 ft., width 40 ft.
2. **10th Street Bridge—**
   (a) Steel superstructure, span 69 ft., width 66 ft.
   (b) Reinforced concrete floor for same.
   (c) Concrete abutments for same.
   (d) Reinforced concrete arch, span 66 feet, width 66 feet.
3. Removal of old bridge and construction of temporary one.

A certified bank cheque payable to the Treasurer of the Town of Owen Sound for 5 per cent. shall accompany each tender, to be returned in case of non-acceptance, and to be forfeited in case the accepted tenderer declines the contract or fails in the performance thereof.

Plans and specifications may be seen at the office of the Town Engineer.

Tenderers for steel superstructure to submit plans and strain sheets.

The lowest or any tender not necessarily accepted.

J. K. LESLIE, R. McDOWALL, C.E.,
Chairman Board of Works. Town Engineer.
Owen Sound, March 7. 1911. 11-14

To Carpenters and Joiners

Tenders will be received until **March 28th** for all inside finish, including hardwood floors, doors, stairs, etc., for the Freemasons' Hall, College street, Toronto.

R. J. EDWARDS & SAUNDERS,
Architects.
11-11 18 Toronto street, Toronto.

Town of Sault Ste. Marie, Ontario

Sidewalk Construction

Sealed tenders addressed to W. H. Munro, Mayor, endorsed "Tender for Cement Concrete Sidewalks" will be received by the Town Clerk up till twelve o'clock noon, on **Monday, March 20th, 1911**, for approximately 175,000 square feet of Cement Concrete Sidewalk.

Specifications, instructions to bidders, forms of tender, to be seen at the office of the Town Engineer, on and after March 6th, 1911.

The lowest or any tender not necessarily accepted.

W. H. MUNRO, Esq., W. F. GRANT, C.E.,
11-11 Mayor. Town Engineer.

City of Prince Albert

Tenders for

Intercepting Sewer

Sealed tenders addressed to the Commissioners of the City of Prince Albert and marked "Tender for Sewer," will be received until noon on **Saturday, the 15th day of April, 1911**, for the construction of a Main Intercepting Sewer, as follows:

5,749 lin. ft. 4-ft. 6in. x 3 ft. concrete sewer.

4,640 lin. ft. 4-ft. 3-in. x 2-ft. 10-in. concrete sewer.

2,798 lin. ft. 4-ft. x 2-ft. 8-in. concrete sewer.

19 Manholes.

Alternate bids for Reinforced Concrete Pipe will be considered.

Plans and specifications may be obtained at the office of the City Engineer.

A marked cheque for $2,500, in favor of the Treasurer of the City of Prince Albert must accompany each tender submitted.

ANDREW HOLMES.
C. O. DAVIDSON, Commissioners.
F. A. CREIGHTON,
Prince Albert, Sask.,
March 7, 1911. 11-13

City of Brantford

Tenders for Pavement

Sealed tenders addressed to Alderman C. H. Hartman, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received until 12 o'clock noon on Thursday, **March 30th, 1911**, for the construction of a pavement on South Market Street.

About 5,000 [illegible] which 800 square yards will be on a ten per cent. grade.

Tenders for different kinds of surfacing will be received.

Concrete foundation for this pavement will be laid by the City.

Single track line of Street Railway on street.

Plans and specifications may be seen, and instructions to bidders and forms of tender obtained at the City Engineer's Office.

Each tender must be accompanied by a marked cheque for 5 per cent. of the amount of the tender.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer's Office, City Engineer
Brantford, March 13, 1911. 11-12

TENDERS WANTED

Tenders will be received by the undersigned until noon, **Thursday, March 23rd**, for all trades required in the erection of St. Helens Presbytery, Dundas street, Toronto.

Lowest or any tender not necessarily accepted.

E. W. HOLMES, Architect.
11-11 [illegible] street east, Toronto

Sand Dredge for Sale

[illegible] Sand Dredge in excellent condition, [illegible] boiler, "A" frame, spud cutter, etc.

Accessories include 500 feet of steel discharge pipe, of which 250 feet is fitted with flexible joints; also seven pontoons to carry same.

For further information and details apply to [illegible] of Hamilton, Canada.

Hamilton, Canada, March 1st, 1911. 10-11

Tenders Wanted

Tenders will be received by the undersigned until 5 p.m. on **Friday, March 24th, 1911**, for the various trades required in building chapel, principal's residence, and additions to Wycliffe College, Queen's Park, Toronto.

The lowest or any tender will not necessarily be accepted.

GORDON & HELLIWELL,
Architects.
Confederation Life Building,
11-11 Richmond street east, Toronto.

Sealed Tenders

will be received until **Monday noon, April 3rd**, for the construction, delivery and erection in place in Welland, Ont., of one unit of water power driven waterworks pumps, three million imperial gallons daily capacity, including turbine, pipes, valves, etc.

Specifications, prepared by Mr. Wm. Kennedy, Jr., Engineer, Montreal, may be obtained from the undersigned.

Envelopes to be marked "Tenders for Pumps."

R. COOPER,
Chairman Water Commissioners.
11-13 Welland, Ont.

Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on **Thursday, March 28th, 1911**, for the supply of Steel Extensions for Manholes on 6-ft. Steel Pipe-line.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained at the office of the City Engineer, Toronto.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council or officers of the Corporation of the City of Toronto, or in lieu of said sureties the bond of a Guarantee Company, approved as aforesaid.

The usual conditions relating to tendering, as prescribed by City By-law, must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.
City Hall, Toronto.
March 7, 1911. 11-11

For Sale

The Board of Power and Light Commissioners of Ingersoll, Ont., have for sale for immedate shipment, two 25 h.p. Induction motors, C. G. E. 3 phase, 220 volts, 4 Canadian General transformers, each 15 k.w. capacity, 2,200-220 volts, 60 cycles, S. P. direct current Arc Lamps, direct current motors, 220 and 110 volts from 1 to 40 h.p., and for delivery within a few weeks, steam engines, boilers and general steam plant accessories. Particulars on application.

W. R. REYNOLDS.
11-13 Superintendent.

Miscellaneous

Advertisements under this heading two cents word per insertion

REPRESENTATIVES WANTED—Large American firm manufacturing waterproof coating for concrete, wants to secure reliable firm to handle their product in Canada. Good inducements. Box 243, Contract Record, Toronto, Ont. 11-12

Business Buildings and Industrial Plants

(Continued from page 55)

engineers, New York, are preparing plans, etc.,

Ottawa, Ont.
Holbrook & Sutherland have been awarded the contract for erection of business building on Queen street for Hiram Robinson. Plans prepared by James Mather call for a 3-storey building 99 feet square, built strong enough for further additions.

Port Arthur, Ont.
The Imperial Construction Company has the contract for the enamel works here. It is stated that they also have contract for erection of Port Arthur Wagon Works plant. R. Gregg, president of former.

St. John, N.B.
The contract for the concrete foundation of five large buildings for the Atlantic Sugar Refinery here has been awarded to the Foundation Co., Ltd., of Montreal. Estmiated total cost of plant, $2,000,000.

Sydney, N.S.
The Nova Scotia Construction Co. has been awarded several large contracts by the Dominion Iron and Steel Company, consisting of the erection of several brick buildings, construction on which will be started.

Vancouver, B.C.
The Norton-Griffiths Steel Construction Company have been awarded the contract for construction of 12-storey steel and concrete office building on Granville street.

Winnipeg, Man.
F. W. Downs, well-known local contractor and builder, has been awarded by the C. P. R. a contract for the erection of a number of railway stations and houses for section men.

The contract for superstructure, power sub-station No. 1, King street, has been awarded to J. McRiarmid Co., Winnipeg, at unit prices. Estimated cost, $37,607. M. Peterson, secretary, board of control.

Power Plants, Electricity and Telephones

Fort William, Ont.
The Mt. McKay and Kakabeka Falls Railway Co. has secured the required right-of-way and extension will be made at once. D. J. Piper, reeve of Paipoonage Township.

Kincardine, Ont.
The time for receiving tenders for construction of telephone lines for the Bruce municipal telephone system will be extended until March 25th. Noted in issue of March 8th.

Leith, Ont.
Tenders addressed to Geo. Buzza, Annan, and C. P. Day, Leith, of Annan-Leith Telephone Company, will be received until March 20th for the supply of 200 telephone poles, 20 feet long and 6 in. top, to be delivered not later than April 15th.

Moncton, N.B.
The plans submitted showing route of street railway, plans of construction and a complete system in connection with natural gas installation were approved by council. Engineer Mitchell is in charge. The work will mean thirty miles of pipe-laying.

Saskatoon, Sask.
This city has advertised that it will receive propositions from a company willing to build a street railway. Population of 18,000. Jas. Clinkskill, mayor.

Toronto, Ont.
The Board of Control have decided to advertise for tenders for a railway construction plant — comprising traction steam shovels, dinky locomotives and two-way dump cars—either new or second-hand. The estimated cost of the former is $55,108, and the latter $42,705, or a difference of $11,400. This plant is needed in connection with the construction of the new civic car lines. The engineers estimate they will have to deal with 100,000 cubic yards of excavations and 140,000 cubic yards of filling. City Engineer Rust estimates the cost, including the purchase price of plows, scrapers, etc., at $104,871.30, less the value of the plant at the close of operations, which he estimates at $13,923, or a net cost of $90,948.30.

Miscellaneous

Colchester, Ont.
Tenders for making cement tile for Colchester South will be received until April 1st by J. H. Madill, tp. clerk.

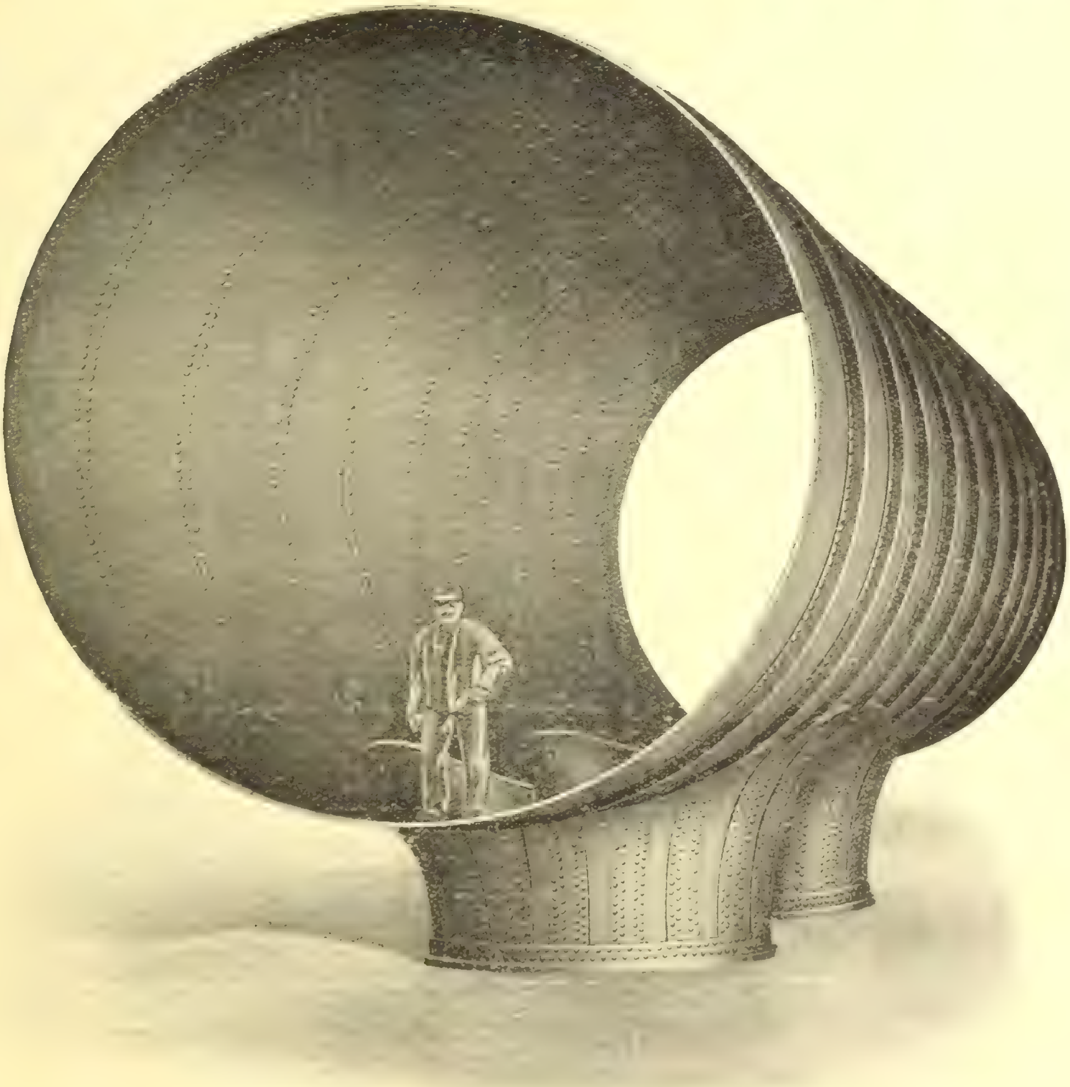
Ottawa, Ont.
Tenders addressed to the Chairman of the Board of Control will be received until March 23rd for supply of twin tank automobile combination chemical fire engine and hose wagon. Information obtained from chief of the fire department. John Henderson, city clerk.

Carmel Freres, hardware merchants, Montreal, have obtained extension.

Roof Leak Paint Co., Ste Anne de la Perade, Que., are stated to have dissolved.

Jos. Belisle & Frere, plumbers, Montreal; J. L. A. Belisle and J. N. R. Belisle, have registered.

PENSTOCKS



Side view of Penstock Distributor built for the Ontario Power Co.

We would be glad to hear from those who have Heavy Plate work of any kind to build and especially American Companies who are contemplating the erection of Penstocks or Heavy Plate work of any description in Canada. We are specially equipped for this work.

Write us for particulars

The John Inglis Company Limited

Engineers and Boilermakers

14 Strachan Avenue, TORONTO, CANADA

RAILWAY CONSTRUCTION PLANT

Hoisting Engines, Horse Powers, Hand Winches, Derricks, Car Wheels, Axles and Boxes, Dump Cars, Rail Cars, Buckets

MARSH & HENTHORN, Limited

Makers of Hoisting Machinery, BELLEVILLE, ONT.

Send for Catalogue

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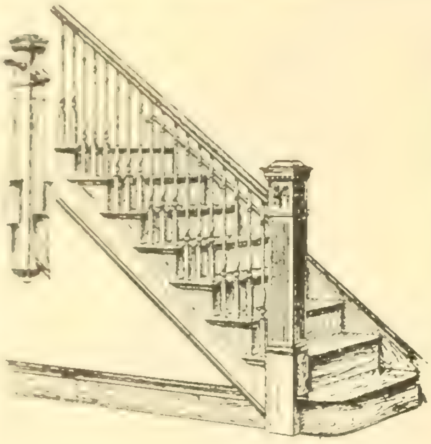
MUSSENS
LIMITED
Montreal, Que.



Stair Work

a specialty with us.

Our knowledge and experience in stair building enables us to turn out this class of work and give the utmost satisfaction.

Pine and Hardwood Veneer

Doors, Interior Trim

Bryan Manufacturing Company Limited
Collingwood - Ontario

—It Makes—

Face Down Blocks

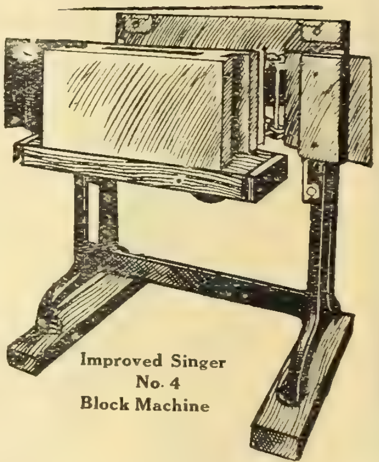
Blocks 4″, 6″, 8″, 10″, 12″, 16″ and 20″ long.
4″, 6″, 8″, 10″ and 12″ wide
All Blocks on One-size Pallet.

Sold in combination to suit purchaser at reasonable prices

Guaranteed against defective material or poor workmanship.

Our catalogue R. with full information and prices on request.

Vining M'f'g. Co.
Niagara Falls, Ont.



Improved Singer
No. 4
Block Machine

TENDERS

For Roofing and Sheet Metal Work

in all parts of Canada

Communicate with

A. Schwoerer & Sons, Inc.
530-34 E. 80th St. New York, N.Y.

Now working in Winnipeg, Regina, Vancouver, Montreal and Ottawa

The Largest Cities and Smallest Towns use

W. E. Seagrave Fire Apparatus

MADE IN WALKERVILLE, ONTARIO

There is a Reason:
The name W. E. Seagrave guarantees the Best, the Lightest, the Strongest, the Most Economical in Operation and Maintenance. No order too large. No order too small. Consult us before buying.

Automobile Fire Apparatus and Motor Driven Vehicles of all kinds, our latest Production.

Renfrew Lime

Lime! Lime! Lime! the very best of lime
From the earliest dawn of time,
Many a city has grown great,
Built with Lime! Lime! Lime!

Built with Lime and Stone and Sweat,
Roman walls enduring yet.
Advertise down to all time,
What you **can** do with **good** lime.

You can build it still today,
Build as well and strong as they,
Build in this or any clime
If you build with **Renfrew Lime.**

Jamieson Lime Company
Renfrew, Ont.
Lime : Brick : Tile

COLLAPSIBLE STEEL FORMS

For the Building of

Culverts, Conduits, Small Bridges, Sewers, Etc.

Our Collapsible Steel Forms are the lightest, strongest and most durable made. They combine in the simplest way every requirement for rapid and practical work, and are attracting wide attention. They are highly endorsed by road and street officials, contractors and engineers everywhere.

Write for Form Catalogue
Engine Catalogue for the asking
Commissioner's Time Book Free

Concrete Form & Engine Co.

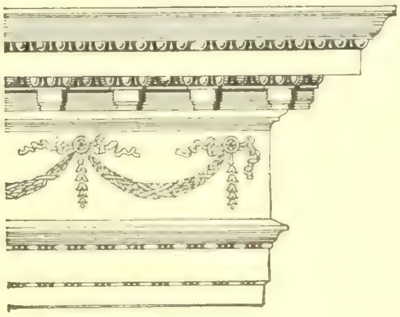
Successor to Collapsible Steel Form Co.

83 Congress St., W., Detroit, Mich.

A good appearance is a letter of recommendation—a house [illegible], a monument to the [illegible]

Superior Quality Material and Workmanship Count

Metallic Cornices



are the MOST ARTISTIC, MOST DURABLE and MOST EASILY ERECTED cornices you can place on any building.
They are made of sheet copper or galvanized steel and are absolutely rust proof.
"Metallic" cornices can be furnished in any design desired to suit your drawings and specifications.
Let us give you prices and full information--send us your specifications. Our catalogue of sheet metal building materials, No. 70, will interest you. Write for it.

Manufacturers

1951

The Metallic Roofing Co Limited
TORONTO & WINNIPEG

The Canadian Boving Co.

164 Bay St. - TORONTO

(Vancouver, 427 Seymour St., H. W. KENT, Local Manager)

3 K.W. Hours on Switchboard for One Cent

No Smell No Noise No Smoke

Suitable for Public and Private Buildings

The Mirrlees-Diesel Crude Oil Engine

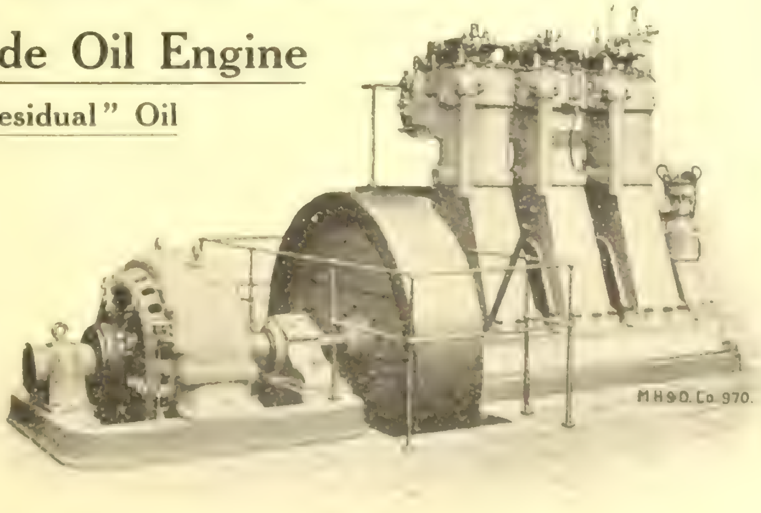
uses "Fuel," "Gas" or "Residual" Oil

No Ignition Gear
No Producer
No Chimney

No Vapourizer
No Boiler
Self Contained

Continuous Running
No Breakdown
Cheaper Buildings and Foundations
Unskilled Labour only
No Standby Losses

HIGH SPEED **SLOW SPEED**



35 to 1000 B. H. P.

[illegible] Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Tenders

A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

Interior Finish

in

Birch, Mahogany, Plain Oak, Quartered Oak, Cypress, etc.

Sash, Doors, Porch Columns, Store Fronts, Mouldings, etc.

S. Anglin & Company
Manufacturers of Fine Woodwork
Kingston, Ontario

"The best is cheapest"

"Sanorto"
Composition Flooring

Guaranteed durable, jointless, noiseless; fire, water, insect and dust proof
For Churches, Hospitals, Hotels and all public buildings it is unequalled. Its use in private houses for bath rooms, kitchens, verandahs, etc, has always given the greatest satisfaction.
Our imitation marble is perfect. Testimonials on application Estimates on all classes of work free. Distance no object. Write for samples

The Sanitary Floor Co.
544-546 King Street West. - - Toronto, Ont.

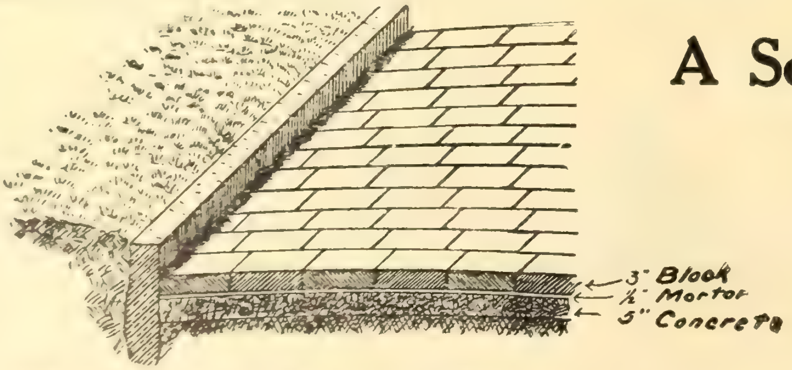
EVERYTHING YOU WANT

in a Factory Site:

Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

Maisonneuve, Que.



A Scientific Pavement

must be

Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by

Asphalt Block Pavements
Send for Descriptive Literature

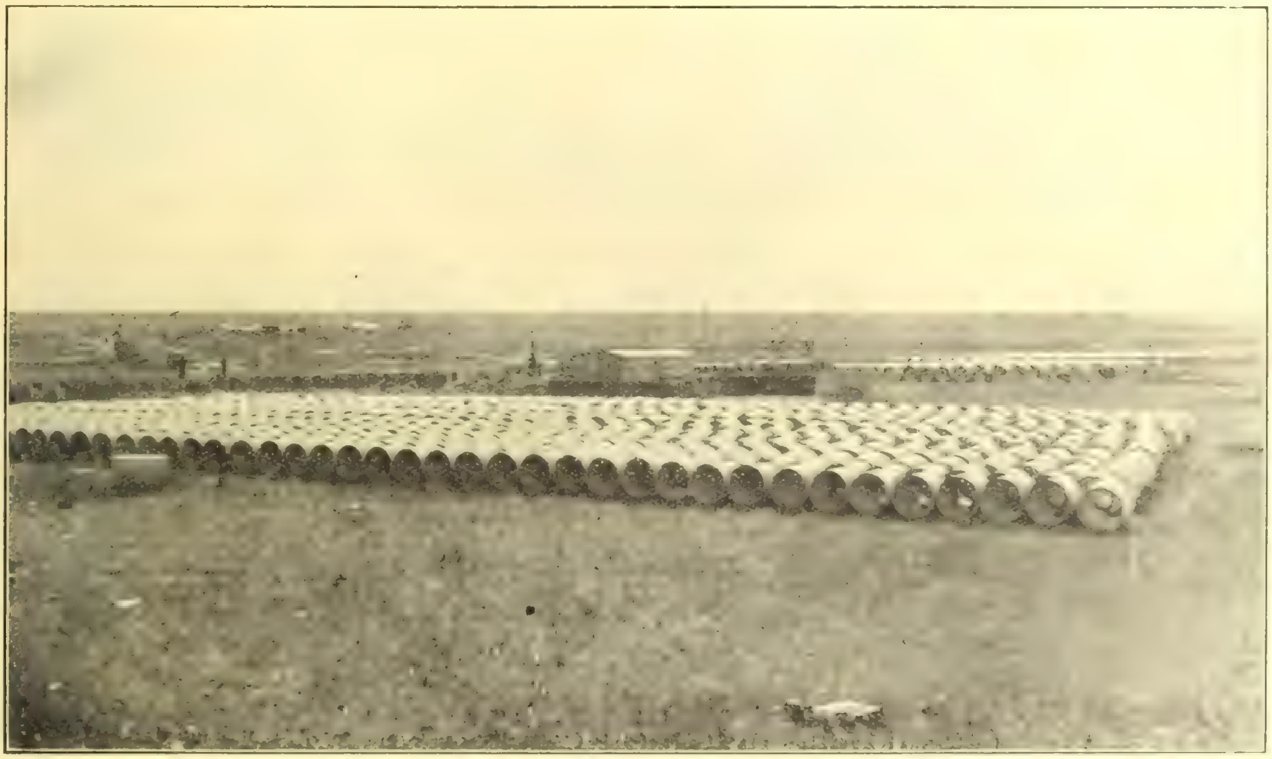
The Ontario Asphalt Block Company, Limited - Windsor, Ont.

Meriwether System

Continuous Re-inforced

Concrete Pipe

Patented



30 Inch Pipe Yard at Regina, Sask.

Lock Joint Pipe Co.

165 Broadway - NEW YORK CITY

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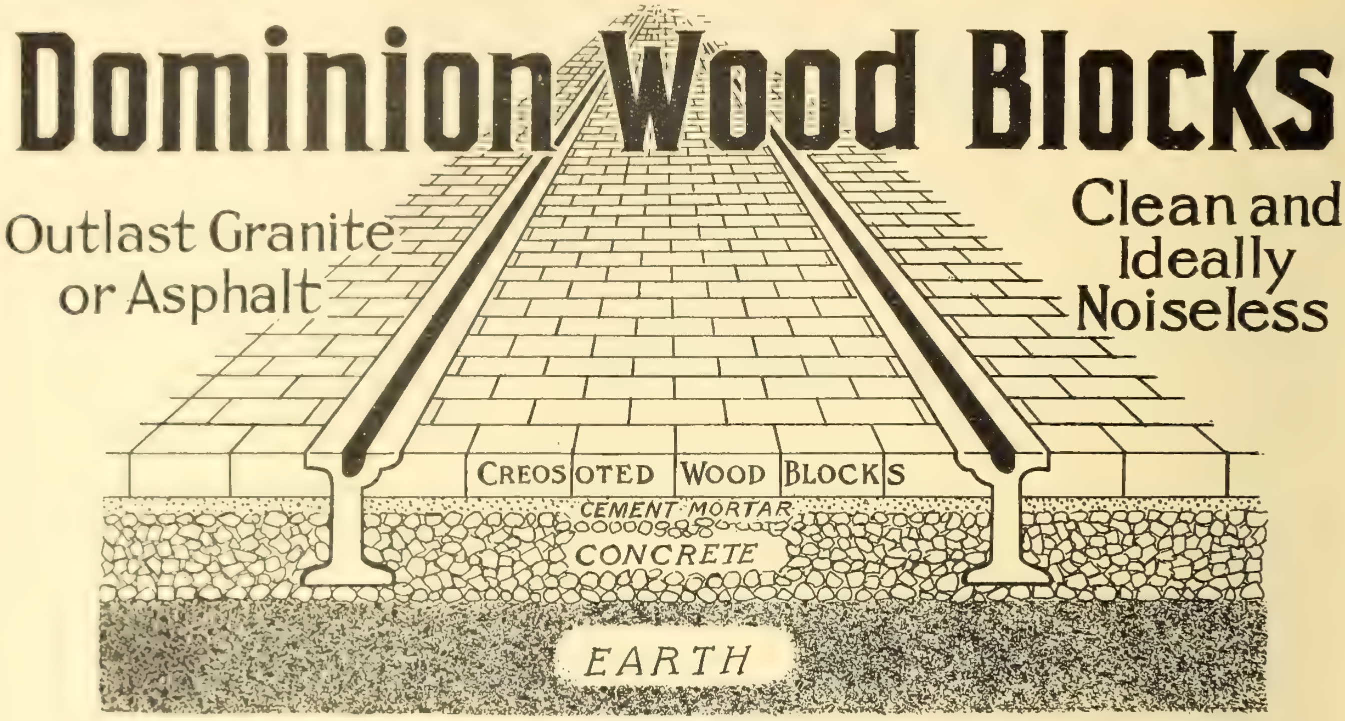
ONTARIO AND QUEBEC
Francis Hankin & Co.
Montreal & Toronto

MANITOBA, SASKATCHEWAN AND ALBERTA
F. H. McGavin Company Limited
Winnipeg

BRITISH COLUMBIA
Pacific Lock Joint Pipe Co.
Seattle, Washington



Dominion Wood Blocks

make the most durable pavement for all classes of service, from the lighest wear of boulevard vehicles to the grinding of the heaviest trucking traffic. It is the one pavement that won't need the annual attention of the repair gang and will pass out of reserve in perfect condition.

Don't put your money in a pavement that will need patching before the final payment is made on the assessment.

Dominion Carbolineum Works LIMITED
Vancouver, B.C.

Every

Luxfer-Prism

is designed to meet a condition and meets it every time

Every architect or contractor who has a lighting problem to solve should recommend **"Luxfer-Prisms"** every time. First expense is last expense except the occasional application of soap and water. When our wrought iron frames are used the side-walks will not warp or sag as with the old system of cast iron frames.

Luxfer-Prism Company, Limited
100 King Street West, TORONTO

THE
MILTON
PRESSED BRICK Co.
LIMITED

Why You Should Specify Milton Pressed Brick

For 20 years it has stood unchallenged, the finest brick produced. Hard, clean cut and perfectly free from sand and gravel. Made in red, red flash, buff, brown and a variety of other artistic tints. Milton Pressed Brick has a clean, hard, fresh appearance — it's different from other makes. Send for a sample brick, see if you can break it, and if you succeed, examine its fine quality.

Head Office: Milton, Ont. **Toronto Office: Janes Building**

EADIE-DOUGLAS LIMITED, Ottawa Agents
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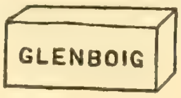

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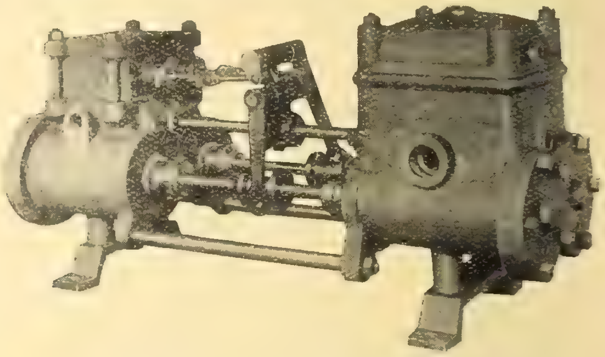

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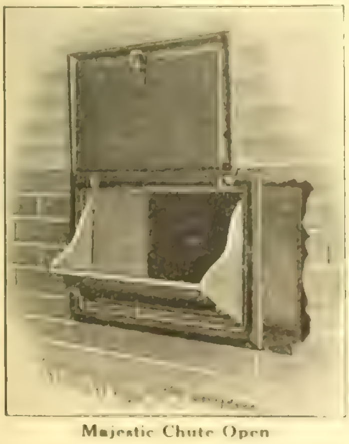

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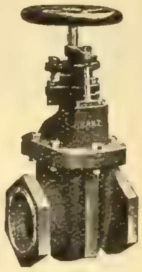

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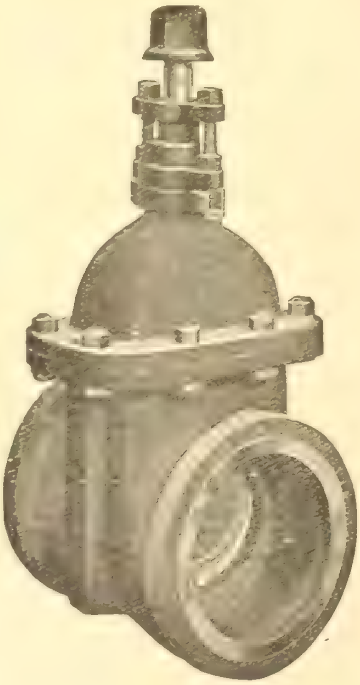

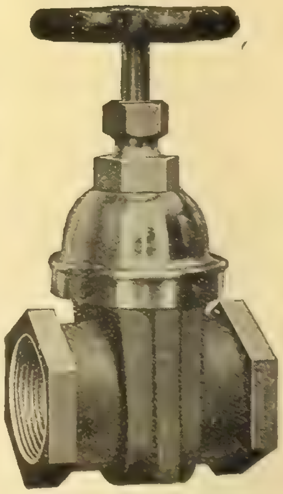

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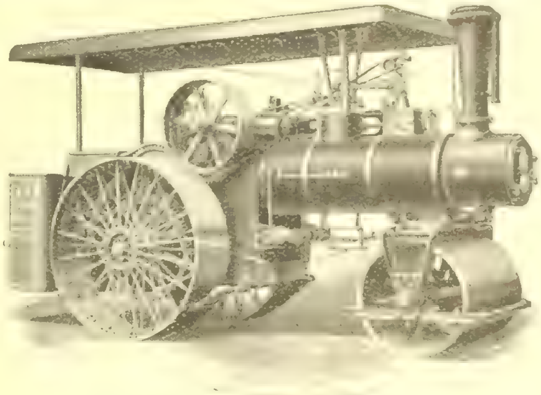

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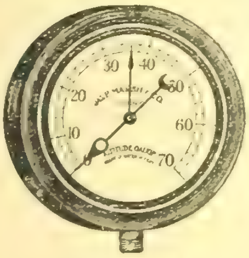

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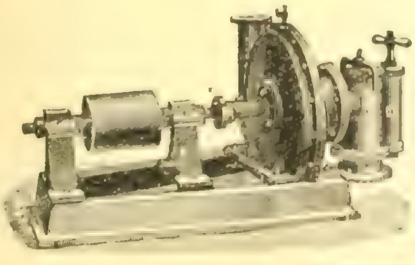

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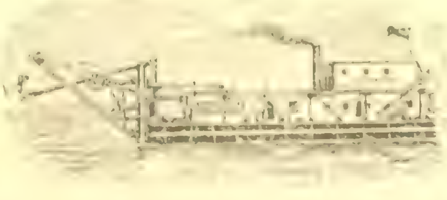

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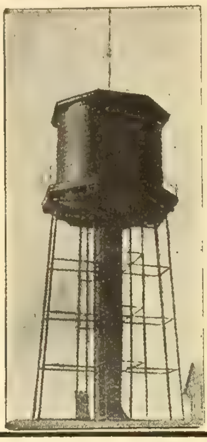

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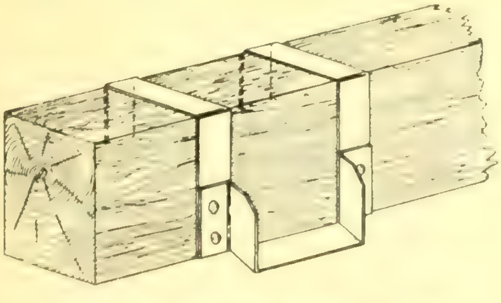

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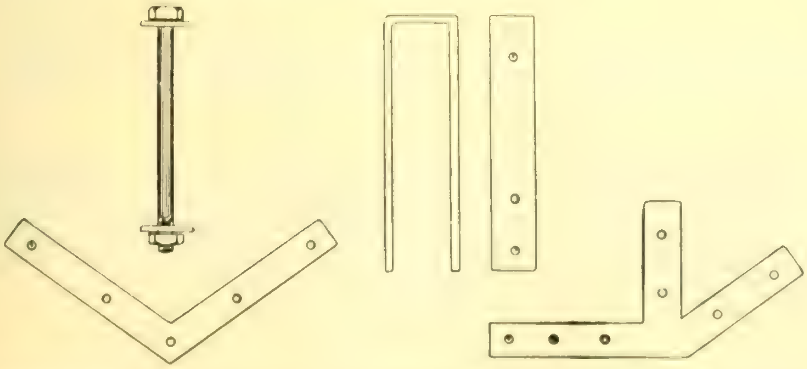

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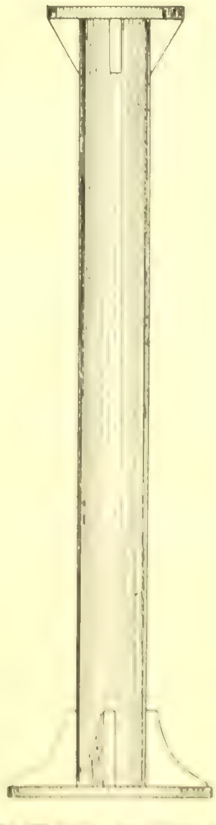

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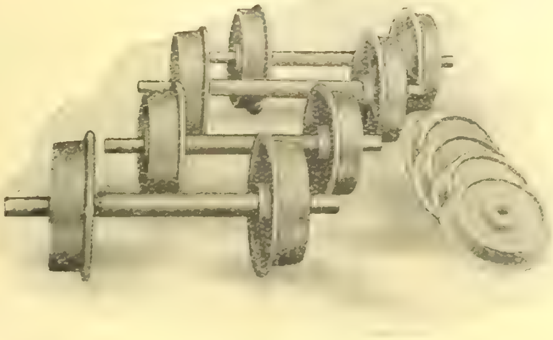

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The following are wholesale prices delivered at Toronto:—

	Per B.
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

		Star.	D.D.
10 to 25	united inches	$4.25	$ 6.25
26 to 40	"	4.65	6.75
41 to 50	"	5.10	7.50
51 to 60	"	5.35	8.50
61 to 70	"	5.75	9.75
71 to 80	"	6.25	11.00
81 to 85	"	7.00	12.50
86 to 90	"	...	15.00
91 to 95	"	...	17.50
Brass Goods, Valves, etc.			
96 to 100	"	...	20.50
101 to 105	"	...	24.00
106 to 110	"	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES.

(Installed in Toronto.)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.
Floor Tile—½-inch square, 65 cents.
Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.
Vitreous Tile—All sizes, according to color, 55 to 65 cents.
Glazed—White, 6 x 3 inches, 55 cents per square foot.
Matt—Dull finish colors, first, 70 cents.
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Opalite Tile—3-16 inch No. 1 standard, size 6 x 3 inches, 6 x 2 inches, 60 cents.
White glass, installed, 6 x 3 inches, 30 cents.

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Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 70 per cent.; roundway, 65 per cent.

No. 4 compression bath cock	net $1.65
No. 4½ Fuller's	net 2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range.

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks.

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95.

Lead Pipe.

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.
Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings.

Medium and extra heavy pipe and fittings, up to 6-inch, 75 per cent.
7 and 8-inch pipe, 50 per cent.
Light pipe, 60 per cent.; fittings, 70 and 10 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.
Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.70.
Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.40.
Binder stone, $1.35 per ton, f.o.b. Toronto.
Burnt River rubble stone delivered, $15 to $16 per toise.
Free stone delivered, $15 to $16 per toise.
Brown coursing stone, delivered, $3.25 to $3.50 per yard.
Grey coursing stone, delivered, $2.25 to $2.50 per yard.
Brown sills and beads, in the rough, delivered, 40 cents per foot.
Rubble stone in car lots, $1.30 per ton.
Scotch fire brick, delivered, $30 to $35 per M.
Steel channels and beams, $2.60 per 100 pounds, delivered f.o.b. Toronto.
Expanded Metal, No. 10 gauge, 3½ cents per square foot.
Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.
Lime, per cwt., delivered, 38 cents.
Plaster of Paris, per barrel, delivered, $2.20.
Manilla Rope, best, per pound, 15 cents.

PAINTS AND OILS.

(Wholesale Prices at Toronto.)

Pure White Lead, ground in oil, $6.25 to $6.50 per 100 lbs.
Pure XX Zinc White, ground in oil, $8.50 to $10 per 100 lbs.
Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.
Boiled Linseed Oil, in barrels, $1.23 per gallon lon of 9 lbs.
Raw Linseed Oil, in barrels, $1.12 per gallon of 9 lbs.
Turpentine, in barrels, $1.20 per gallon.
Pure Linseed Oil Putty, 25-lb. tins, $4.00 per 100 lbs.
Pure Linseed Oil Putty, bulk, in barrels, $3.50 per 100 lbs.
Pure Red Lead, dry, $5.00 to $6.00 per 100 lbs.

Ph. Leclerc and J. Ostrout, contractors, Verdun, Que.; P. Leclerc & J. Ostrout, have registered.

Canada Lime Company, Montreal, are stated to have dissolved; O. Hogue & A. Dufresne have registered.

Roy & Brouillard, plasterers, Maisonneuve, Que.; T. Roy and L. Brouillard, have registered.

Capital Paper Box Mfg. Co., Ottawa, are stated to have dissolved partnership; Kert retired, Harper continues under same style.

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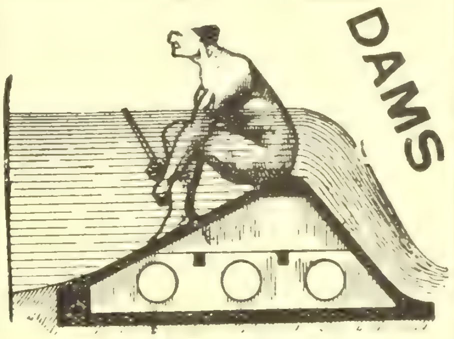

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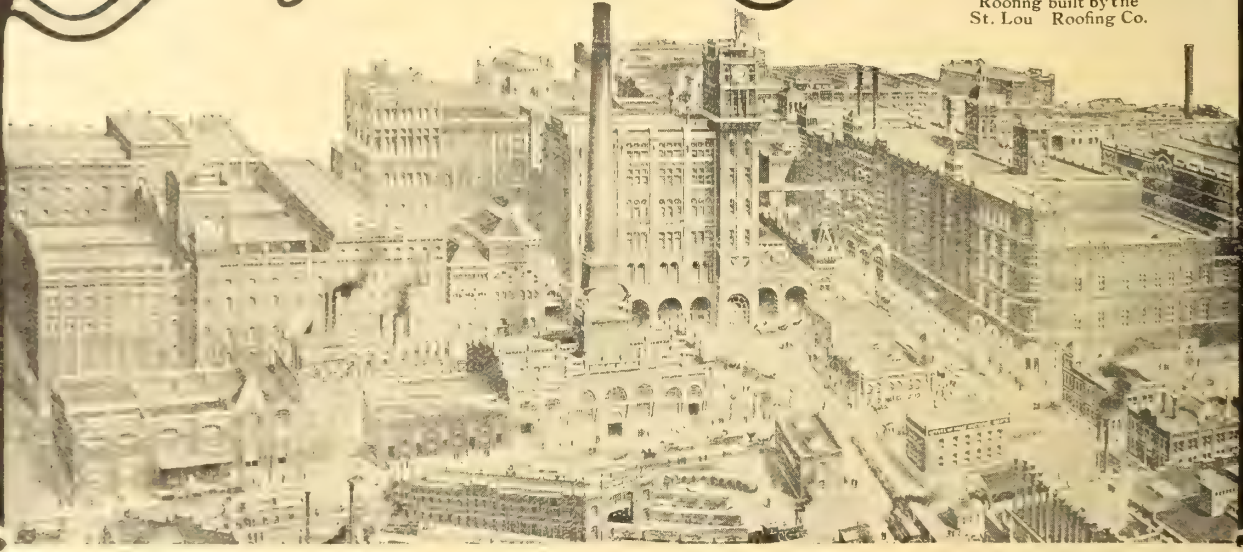

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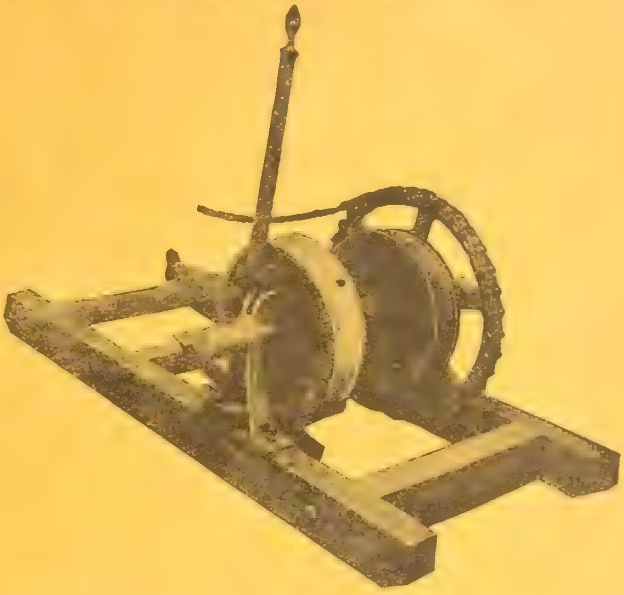

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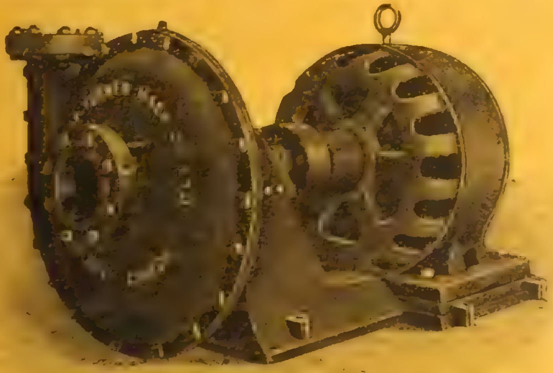

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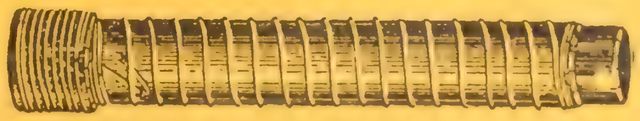

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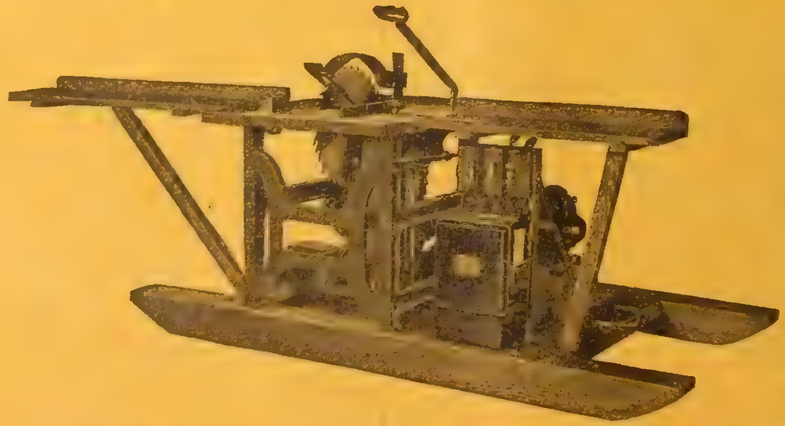

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that out of the mass of enquiries that come to us, there are a number that include questions as to what might be termed Allied Industries. These we now answer to the best of our ability, but we could answer them still more satisfactorily, if manufacturers of materials used in conjunction with cement would co-operate to the extent of sending copies of their catalogues and other literature to be placed on file in our office for reference.

We should like to obtain

the names and addresses, together with catalogues, and any other obtainable information of manufacturers of and dealers in:

1. **Concrete Machinery**
2. **Building Blocks**
3. **Cement Bricks**
4. **Tile Molds**
5. **Fence Posts**
6. **Re-inforcing Material**
7. **Water-proofing Compounds**

It is not alone for our own convenience that we make this suggestion; firms who manufacture or deal in such articles will find it to their own advantage to have this information in the hands of our Information Department, thereby enabling us to hand on to them from time to time enquiries for such materials as they severally make.

In sending catalogues, literature or information, please address same to "Sales Department."

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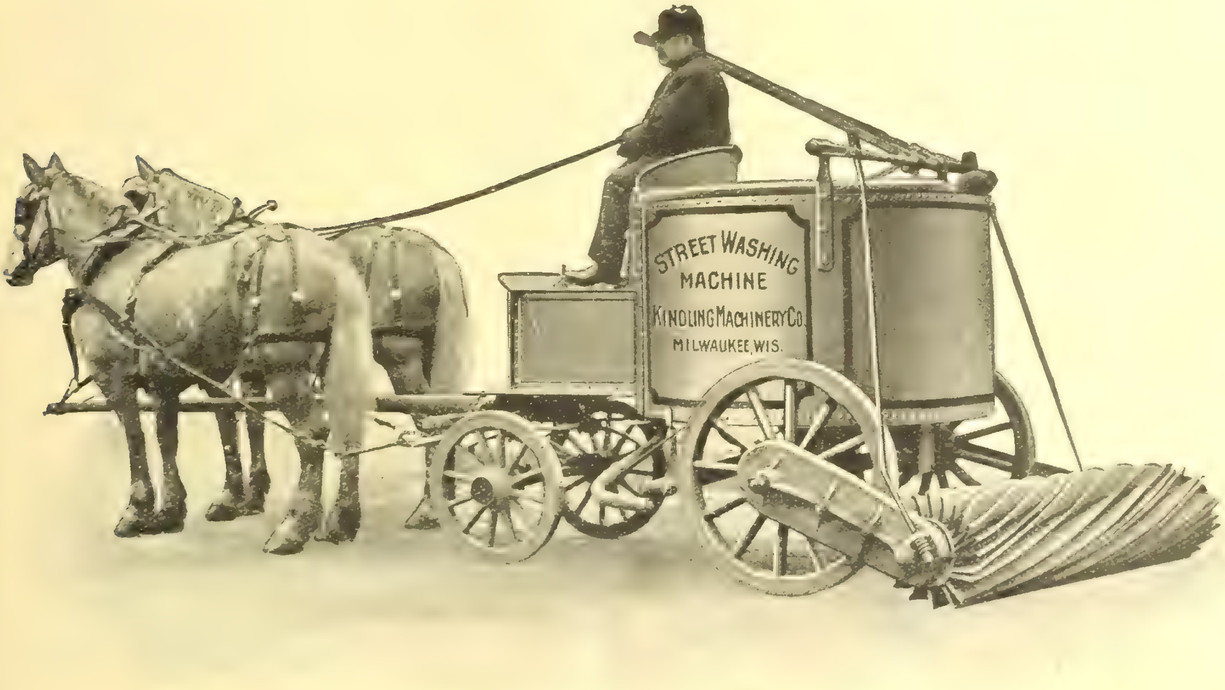

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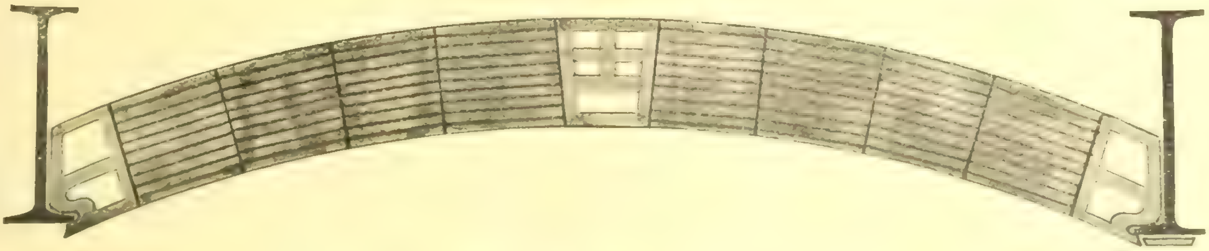

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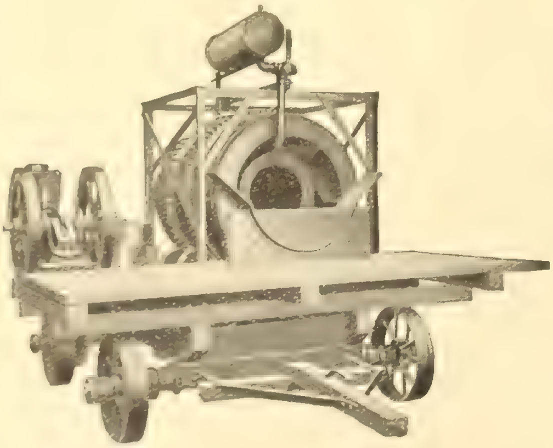

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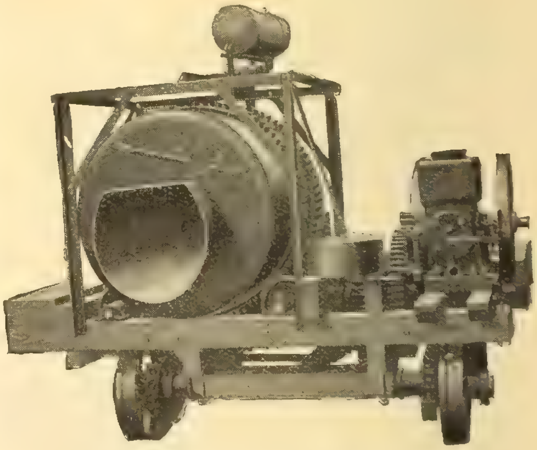

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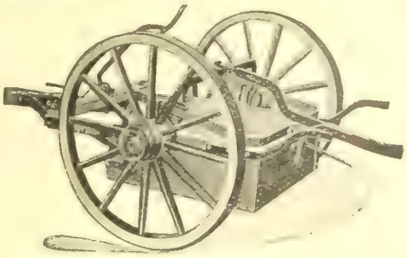

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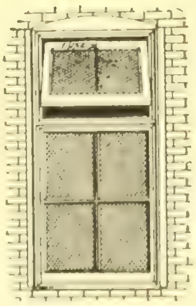

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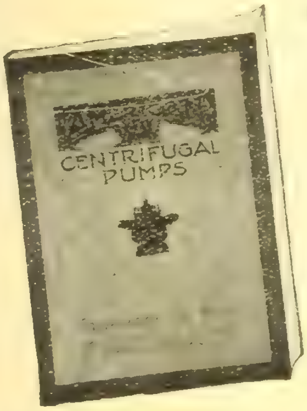

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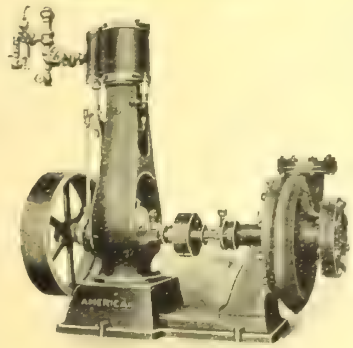

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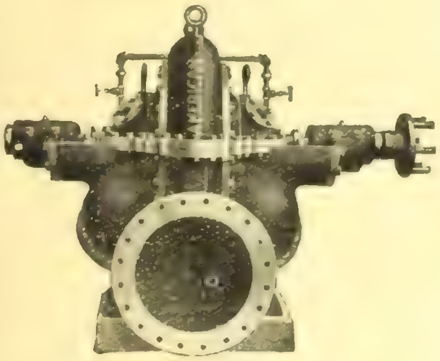

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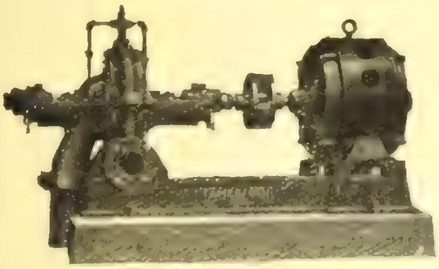

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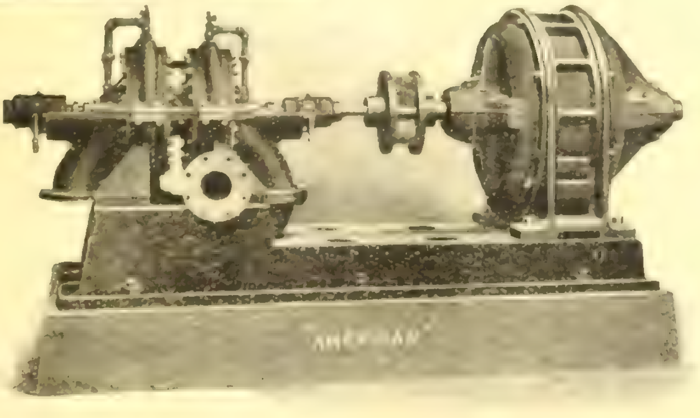

AMERICAN

Catalog Directory

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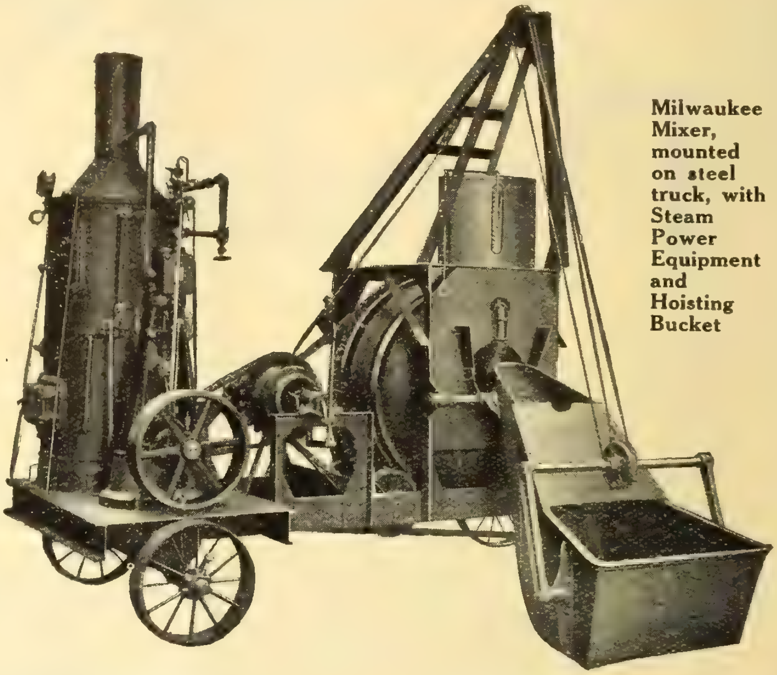

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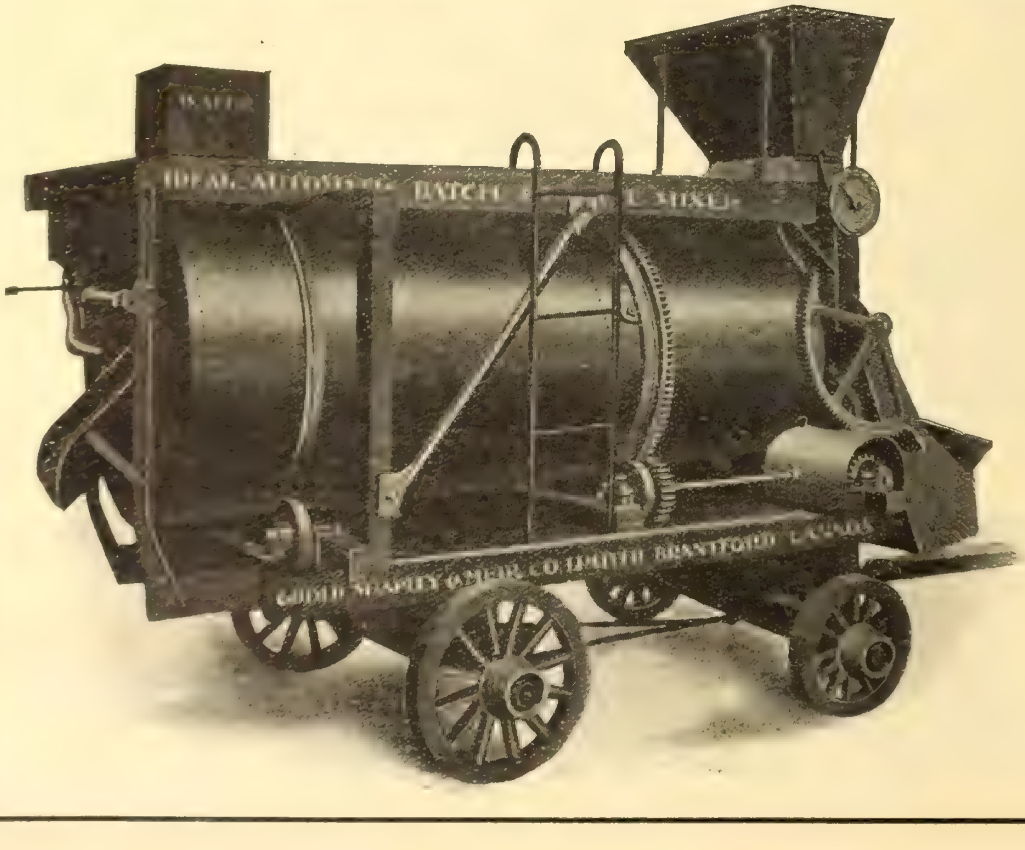

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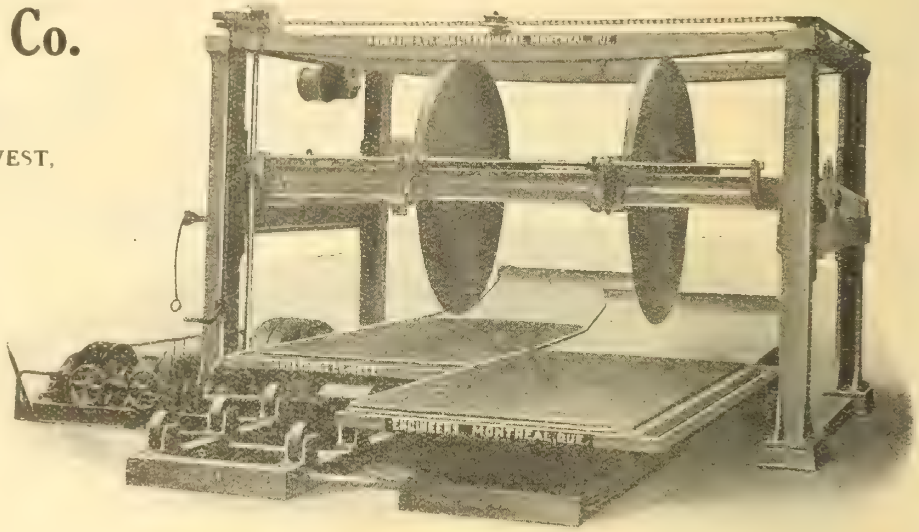

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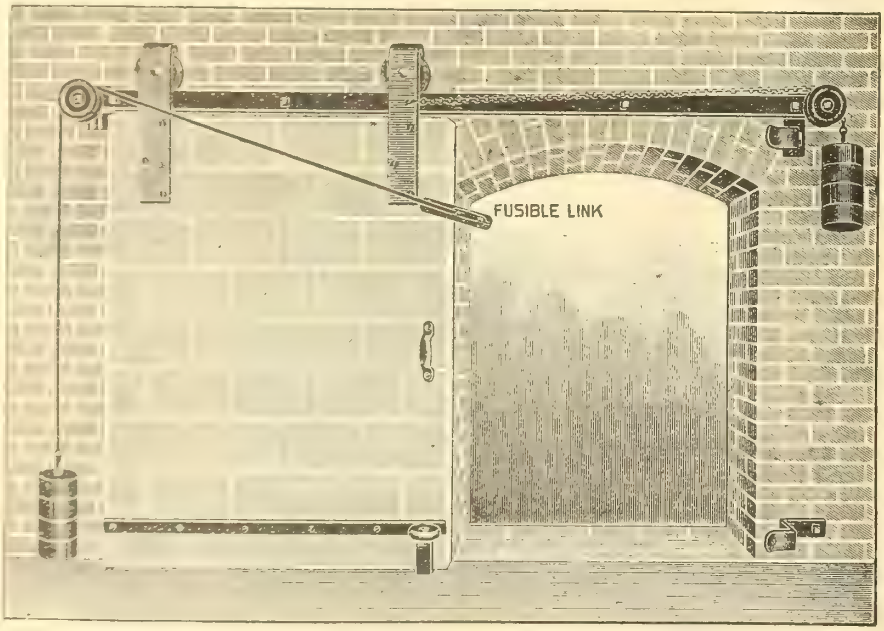

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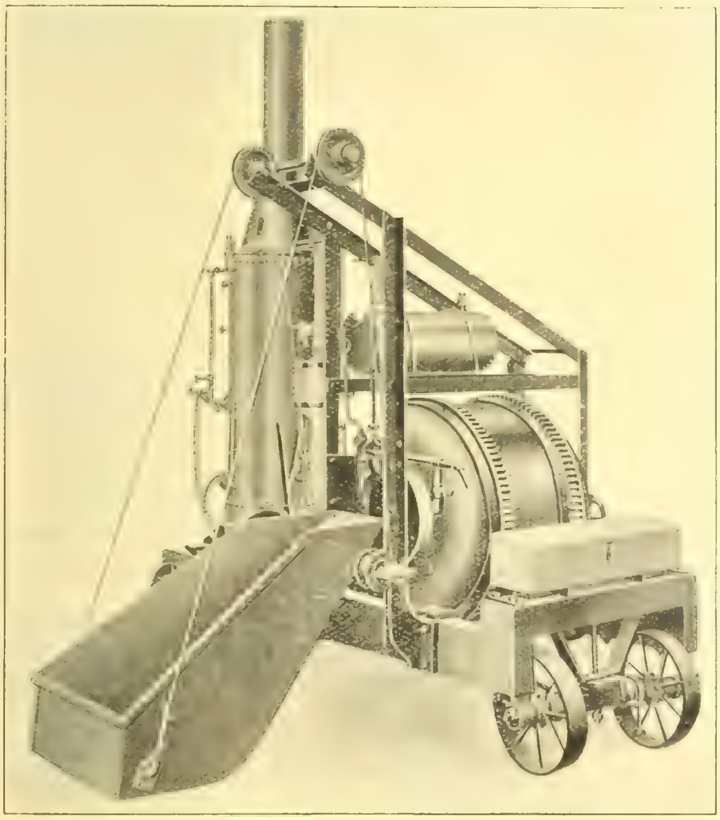

Concrete Mixer theories grow into definite mixing knowledge when every mixing action is a known positive mechanical force.

There's an individuality about Koehring Mixing—it's known mixing.

The drum is a plain cylinder with heavy cast iron heads, but bear in mind, it's made without deflecting faces or other obstructions, to limit the end-to-end mixing.

The mixing blades are so arranged that they not only lift and pour the aggregates from the side but carry them alternately from end-to-end and break them over against the heavy heads.

There's no guess work about it—no rolling over in the centre of the drum, every action of the aggregates is performed by a known positive mechanical force.

But there's another mixing than this in the Koehring Mixer.

When not in discharge position, the inner end of the discharge chute is tilted downward

Material carried up by the mixing scoop at the side is discharged onto the inwardly and downwardly extending chute and decends from the inner end in a continuous flow, the entire width of the chute, and falls to the bottom at right angles to that from the mixing scoops and the end-to-end mixing.

That's three independent mixings, everyone of them a known mixing and no theories required to explain them.

Three known mixings in one, is why the Koehring Mixer is the fastest in existence.

But known mixing is not its only improvement over old style batch mixers.

The trunnion rollers are cast with wide flat faces, chilled to extreme hardness, and placed wide apart at the extreme ends of the drum. This not only guarantees a stable equilibrium to the drum, but insures its maintaining perfect alignment even after years of service. The outer end of the discharge chute does not tilt backwards, affording ample clearance for wheelbarrows, even in the smallest sizes. There are other worth considering features that every mechanical mind knows are correct in principle, explained in our new catalague.

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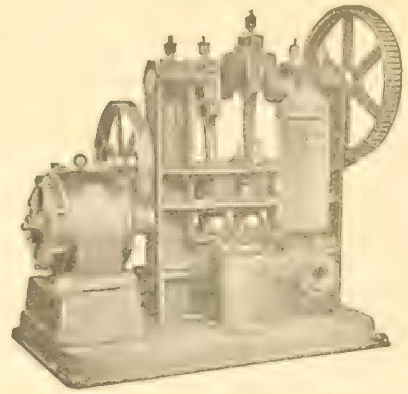

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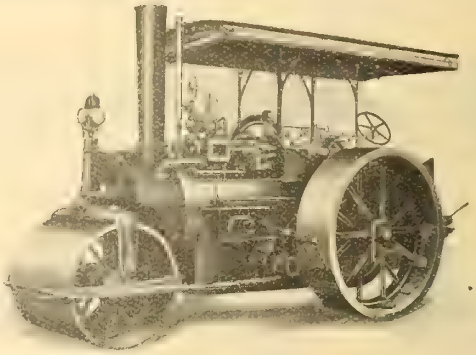

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with you. So don’t be misled by local amateur pipe makers.

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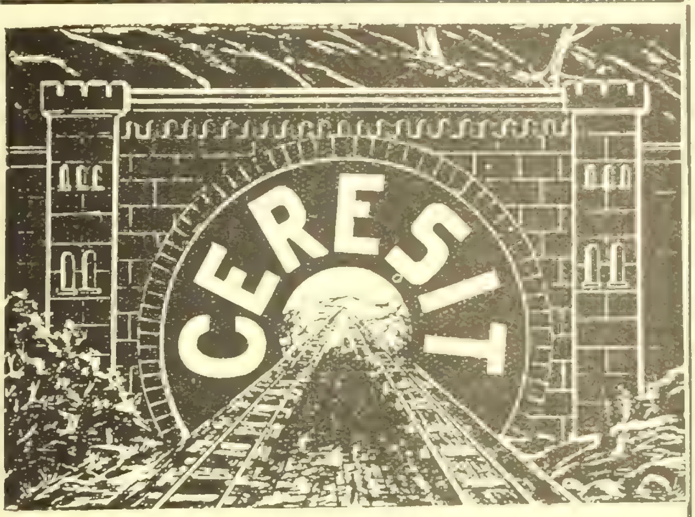

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The only absolutely **durable and frost-proof** culvert pipe is

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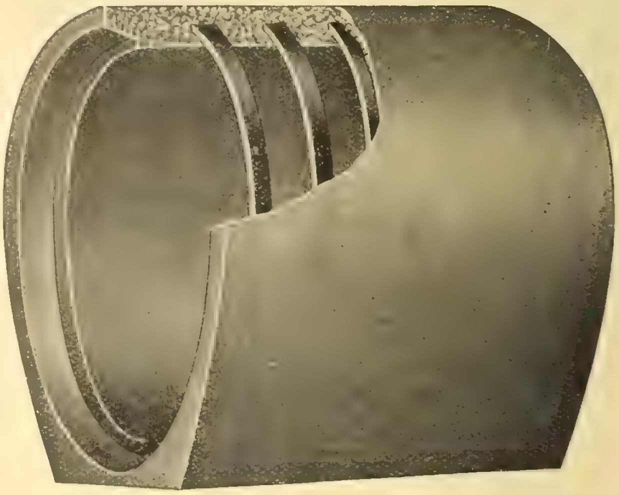

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We possess all these in the highest degree. Our years of experience, our facilities and our raw material enable us to make **good concrete** and make it **always good.**

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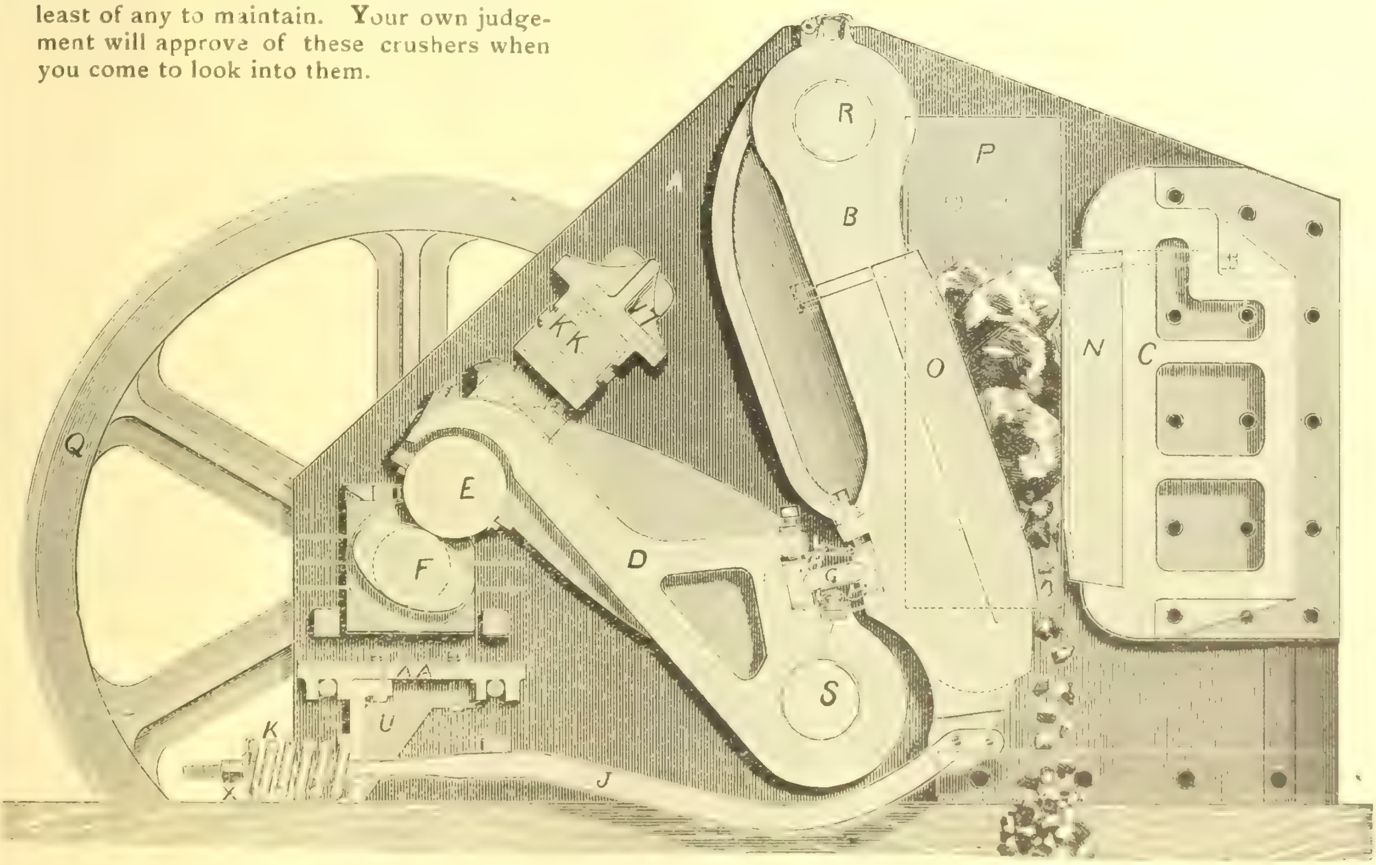

In the diagram you will note the Elliptical Cam is marked F. This is the seat of the action which gives the jaws two motions instead of one. In the diagram A is the main frame, B is the moving jaw, C the stationary jaw, E the anti-friction roller, G the toggle, K J the tension moving spring and spring rod, O moving die, **N stationary die.**

Send today for our Catalog

It gives minute description of the mechanism of the "Champion" road machinery. Ask us any questions and we will give you all information you desire.

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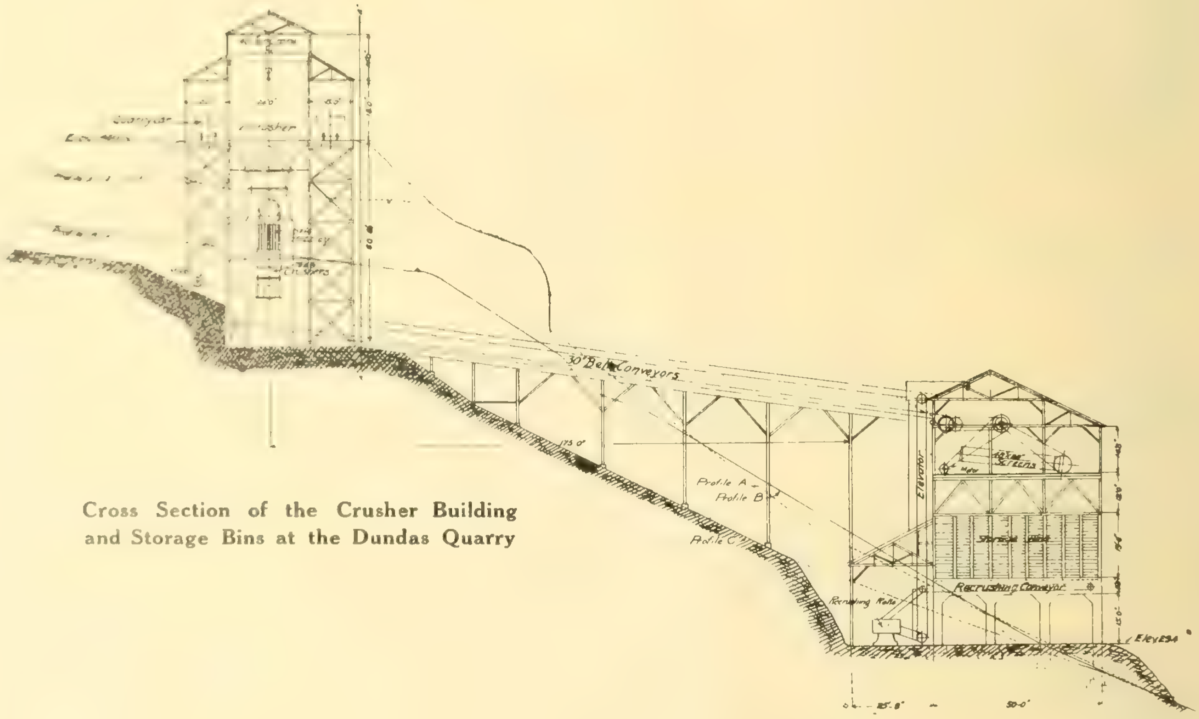

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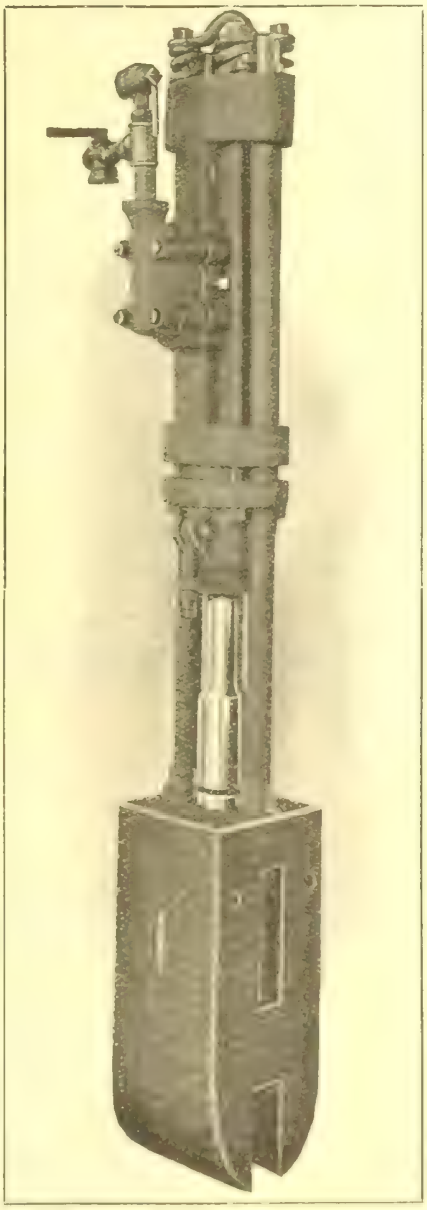

The Rand Sheet Pile Driver

Eliminates the Trouble from buckling of the pile, cramping and loss of alignment and broken piles. This method of driving with a heavy anvil block interposed between the pile and the hammer, which receives the many rapid, sharp but comparatively light blows, does away with brooming, springing and vibrations and the rapid successions of impulses is applied entirely in penetration.

This is a simple, efficient machine of great capacity with the number of working parts reduced to the limit of consistence.

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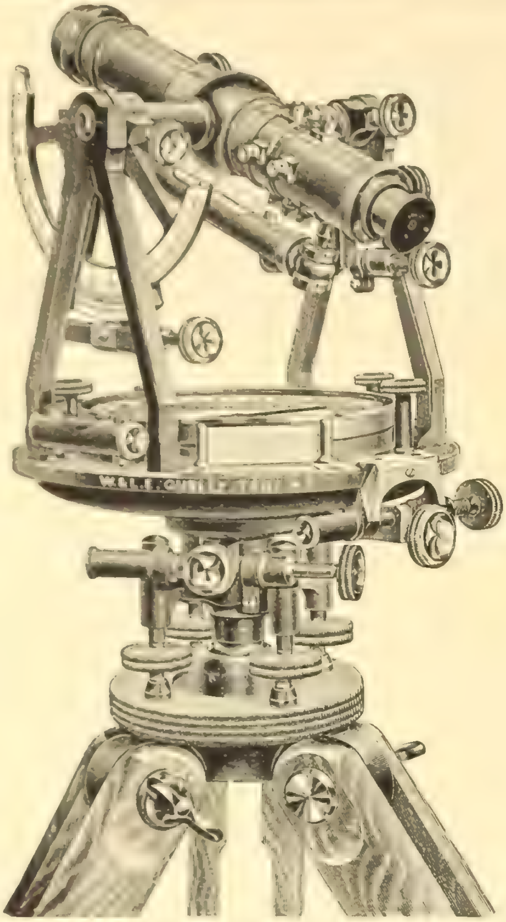

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Loaded cars are hauled alternately up each of the outside tracks shown in the illustration, so that the big crusher receives a load of stone first on one side then on the other making its operation continuous. The empty cars are dropped to the middle track to be assembled into trains and hauled back to the quarry. Another feature of the

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s the storage and bin system shown on the right. The crushed stone may be dropped into a car or a wagon in the compartment on either side as well as the one directly beneath the bin so that the same size may be lowered into several cars simultaneously.

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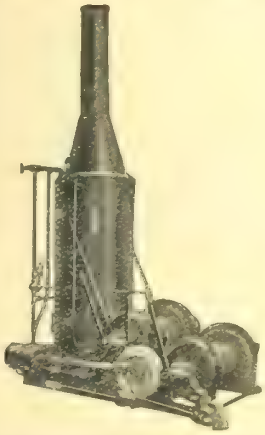

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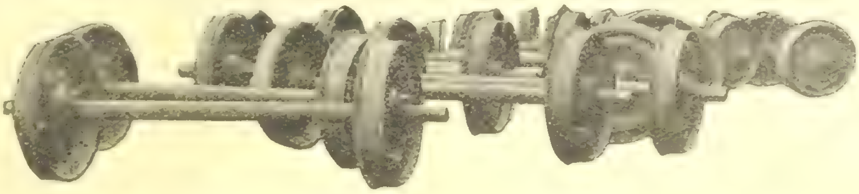

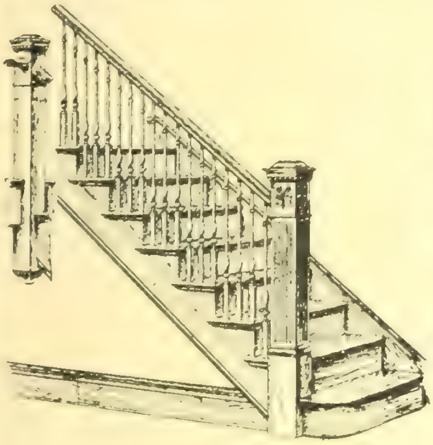

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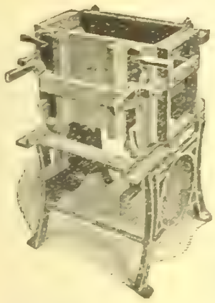
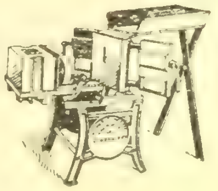


London

Face-Down Adjustable

Concrete Block Machine



makes every kind, size and design of block. **All sizes of blocks made** in the **one adjustable mould. All sizes of blocks made** on the **one size pallet.**

Any size core desired can be used which is withdrawn vertically and thus allowing all blocks to be made by the wet process, or with crushed stone in the block. Machine fully **covered by patents.**

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Asbestos-Cement Shingles are weatherproof — fireproof — timeproof. Cannot rot, rust, crack, split or blister. They literally outlive the building—without repairs.

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You can get Asbestos-Cement Shingles in shapes and sizes to fit any architectural scheme. Three colors, Newport Gray (silver gray), Slate (blue black) and Indian Red. Ask your roofer for new quotations.

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Reinforced Concrete Factory for Ford Motor Co. of Canada Ltd., Walkerville Ontario.

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Watch for our advertisements, you will find them particularly interesting.

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Vol. 25 March 22, 1911 No. 12

Contractors' Bonds

Contractors and builders are becoming more and more appreciative of the advantage of corporate bonds to guarantee the completion of their contracts. The amount of capital withdrawn from operating channels and tide up by the cash deposits required with bids and under contracts is simply appalling. On the sums thus deposited the government pays only four per cent. If the government needs the money, why does it not borrow from the banks direct? This would relieve the strain on the credit of the contractors, who can obtain as sufficient substitute the credit of the corporate bonding companies.

In supplying the personal bonds and marked cheques necessary in average work, the ties of friendship and reciprocal obligation are often strained to the breaking point. The contractor is frequently obliged to obligate himself to some particular supply house for note endorsement favors, and in such a case he loses the advantage of competition in the supply market. The resulting chain of credit complications covers the country like a mesh. It is in spite of this heavy burden that the present wonderful development of construction work in Canada has been brought about.,

A change of policy by the Dominion government would at once relieve the situation. The authorities have empowered reliable corporations with large capital to transact this business and the acceptance of their bonds is recommended in lieu of cash deposits. The unquestioned credit of these institutions would take the place of the cash deposits and release large sums for use in actual development. In general contract work, where corporate bonds are accepted, the business in Canada has been confined heretofore to two American companies—one an ultra-conservative concern, the other more enterprising, doing the bulk of the business and thus setting the pace. But at best these concerns have only scratched the surface of the field. Four other companies have entered this year, however—two British and two American firms, while other Canadian and British companies are looking over the ground. The present rate of premium charged for contract bonds is one-quarter of one per cent. of the face of the contract. In British Columbia it is forty cents per one hundred up to thirty thousand dollars, and thirty cents above that amount. The rate charged in the United States is somewhat higher, and rumors have been heard of an advance here, but as the pioneer company in the field is opposed to any advance, no immediate change is probable. A number of large contractors, who are able to finance their operations themselves, would welcome the enforcement of corporate bonds by the government, because it would keep out the irresponsible outsiders who put up the deposits, make low bids, ship with the proceeds and leave the supply people to hold the bag. Ability to secure a corporate bond enables a contractor to sign his name with indelible ink.

Conditions in Railroad Camps

In another column will be found an interesting article by Mr. J. M. Shanly, of Montreal, relating to conditions in railroad construction camps. These conditions were discussed editorially in our issue of January 11, our article in that number having been inspired by a letter written by a Mr. Gubrandsen to the Montreal Star. In the main Mr. Shanly's letter bears out the contentions of the former writer, and for this reason we are of the opinion that the matter should be carefully investigated. Mr. Shanly is well known to the engineering profession, is a prominent member of the Canadian Society of Civil Engineers and is qualified to give absolutely reliable testimony. We cannot but think that conditions such as those to which Mr. Shanly refers are inimical not only to the best interests of the country in general, but in particular to contractors themselves, and it is from the latter source that we would welcome some information at this time. Of course, the contractor cannot be expected to establish model villages along the line of his construction, neither can he be held responsible for all the mishaps which befall the various cosmopolitan units of his working gang. He has to take whatever samples of mankind are offered, whether from Chile or Peru, from Italy or Iceland, Germany or the Russian steppes. One can neither understand such people, nor be understood by them, and it is a sufficient task to set them to work without prying into their family matters and ascertaining whether their savings are secured in the event of a premature explosion of dynamite or something of that kind. At the same time we believe contractors should be interested in working towards some improvement. Canada has mapped out a great programme of construction and with the labor which this will entail it will not be wise to offer any discouragement to the working classes in foreign lands. And discouragement has been given them, for, as mentioned in our former article, Mr. Jacobsen, the Norwegian consul at Montreal, sent a warning to his countrymen last fall against coming to Canada to engage in railroad construction, stating that the conditions are both inhuman and unfair.

Mr. Shanly concludes by making a few suggestions for improvement which appeal to us as being worthy of attention. He is not very sanguine as to the benefits to be derived from government supervision. In this we do not altogether see eye to eye with him, but at any rate we are interested in his views and would appreciate some discussion thereof on the part of our contracting friends.

Unsavory Conditions in Railroad Camps

Not the Kind to Attract Labor to this Important Field—Suggestions Looking to Improvement—Supervision by the Government

Montreal, March 16, 1911.

Editor Contract Record:

Referring to your article, "Conditions in Transcontinental Railroad Camps," published recently in the Contract Record, I have had no experience in the conditions on the particular work you mention, and can therefore say nothing definite about them, but unless they are better than is usual on similar undertakings, there is a great deal of room for improvement.

Camp buildings on railroad work are of a very temporary nature, and are usually built in sections of the country where supplies of material from the outside world are hard to get and very expensive. The contractor is therefore forced to use what he finds on the spot. The walls are generally round logs chinked with moss and clay; the roofs split cedar slabs, bark or even brush and earth. The floors are sometimes earth and sometimes poles or flatted logs. Windows, being hard to get, are reduced to a minimum, and ventilation is sometimes insufficient and sometimes too ample. In order to economize space men are packed together, usually two in a bunk. The bedding of boughs, hay or straw, once put in is never changed or aired, neither are the blankets. The men sleep with the greater part of their clothes on—the same clothes in which they have worked all day. Faces and hands are usually washed before meals, but baths are practically unknown. Underclothing may be changed occasionally, and in the warm weather there is usually some laundry work done on Sundays, but this depends a good deal on the fancy of the wearer.

Food in the boarding camps is coarse, but usually wholesome and well cooked.

To secure a water supply camps are located, where possible, on a lake or running stream, but where this is impossible shallow wells are dug which catch the surface water. No regular latrines or dumping places are established, but all refuse is thrown out near the camp and usually without considering whether or not it may contaminate the drinking water. Birds and small animals, however, act as scavengers and reduce the nuisance considerably.

When a man gets too sick to go out to work he lies in his bunk until he gets better, dies or is sent out to civilization. If his disease is contagious there is no means of isolating him and his blankets and bedding may become a source of disease for others.

Where doctors are employed they are usually young men fresh from college and without much experience; often they have long distances to cover, but I believe that on the whole they do their duty to the best of their ability.

The laborer is usually strong and hardy. While in the woods he leads a temperate, healthy life, and his ailments are mostly of a trifling character and such as the cook can cure with simple remedies. He, however, is a nomad and often throws up one job and travels off to look for another without any apparent reason. When in civilization—if he has any money—he is apt to go on a spree and in that condition may come in contact with infectious diseases, the germs of which he brings back to camp, where they have every chance to thrive and multiply. Disease germs do not originate in the camps but must be imported. Vast numbers of foreign laborers, who do not understand our language and know nothing of sanitation, are coming in every year. If one of their number is sick, his companions look after him and are apt to say nothing about it to the doctor until the disease, if contagious, has got to such a state that the whole camp may be infected. Neither the foreman nor the contractor, be they ever so willing, can do much with such cases as this, and any attempt on the part of the authorities to institute a regular system of personal sanitary inspection would be resented by the men themselves and cause strikes and endless troubles.

Accidents, of course, are known at once, and the doctor is usually hurried to the spot to give such assistance as he can. Under the conditions prevailing the injured man has a pretty hard time of it. His wounds are dressed and he is taken to his bunk in camp. If he has to be sent out to a hospital he may have to walk a long distance or be driven over a rough road in a springless cart. If he stays in camp, he lies alone all day in his bunk. His fellow workman is too busy to do anything for him except at night and at meal times, and it is therefore not to wondered at if he dies.

Workmen Generally Careless.

Accidents are usually due to carelessness on the part of the victim himself or some of his fellow workmen. Once a man begins to handle explosives he seems to lose all fear of them and nothing can convince him that a dynamite cartridge is a thing to be handled with care and treated with respect. A contractor can hardly be expected to provide hospital facilities for men who habitually disregard plain instructions given them for their own welfare.

In the case of men who die on the works, the notification of their friends at home often depends on their companions. This is particularly so in the case of foreigners. A man who speaks neither English nor French is officially known by his number only. The foreman may know him as Tony or Ole, or John, but that is all. If the man is killed, the interpreter, whose English is usually weak, may tell some one his name and address. The man he tells it to, usually one without much education, reports it, as he understands it, to the foreman or timekeeper, who in turn sends his version to headquarters—and by this time the man's own mother would not recognize it. Some of the foreign consuls do endeavor, I believe, to keep track of these men, but it is impossible to follow them all in their wanderings from camp to camp.

As to the claim that exhorbitant prices are charged for supplies, I can say nothing except that the desire to take advantage of the needs of others for personal advantage is no more strongly developed among contractors than among any other class of people. Such things go on everywhere. Laboring men do not usually realize that the value of any commodity depends not only on its market value at the point of production, but on the cost of bringing it to the consumer;

and what would be an outrageous price in Montreal or Toronto may barely cover the cost out in the woods. I, myself, have seen a barrel of cement double in value in taking it from the nearest point on the railway to the site of the works. And the haul was not very long at that.

In conclusion, I might add that the only solution of these difficulties appears to me to be in the teaching of foremen, camp cooks, laborers and others who frequent camps, the principles of sanitation; by issuing pamphlets containing instructions, and posting conspicuous notices, in different languages, where they can be seen and read by all, and by requiring the doctor, or some responsible official on the spot, to inspect each camp from time to time and report to the government health officials. Accidents will continue as long as explosives are used, for you cannot teach the workman to handle them carefully. And ignorant men will continue to be robbed by sharpers both in the wilderness and in civilization. Supervision by the government, if properly carried out, would no doubt improve conditions, but it would be necessary to cut out politics entirely.

Yours truly,

J. M. SHANLY.

The G.T.P. Elevator at Fort William, Ont.

Complete Plant, with Storage Capacity of Forty Million Bushels, will be Largest in the World—Constructional Details of First Section

The largest grain handling and grain storage plant in the world is that which is now being built for the Grand Trunk Pacific Railway at Fort William, Ont., to serve the enormous and increasing traffic due to the development of the wheat-growing districts of western and northwestern Canada. When the Fort William plant is completed it will have a storage capacity of 40,000,000 bushels, but it will be built in four separate units for 10,000,000 bushels each. The first section, which was completed in December, 1910, has a storage capacity of 3,500,000 bushels, with equipment for handling and cleaning. The cost of this section was about $1,250,000.

Preliminary plans for the plant were prepared by the engineers of the railway during 1906-1907. In 1908 a contract was awarded to the Canadian Stewart Company, of Montreal, for the construction of the first section (3,500,000 bushels capacity), according to plans and specifications submitted by that company. The work was commenced in November, 1908. The designing was under the direction of Mr. R. H. Folwell, chief engineer; the construction was done under Mr. W. R. Sinks, general manager, both of the contracting company. Mr. John S. Metcalf was resident engineer for the owners. The plant will be operated by a subsidiary company, known as the Grand Trunk Pacific Elevator Company, of Winnipeg. Fig. 1 is a view of the shipping side or water front of the elevator. Figs. 3, 4 and 5 show the general construction and arrangement.

The elevator was built on reclaimed land on the delta formed near Lake Superior by the Kaministiquia and Mission rivers. It is founded on 55-ft. timber piles driven to rock. A heavy concrete mattress and walls distribute the load evenly over this footing. A concrete wharf 337 feet long and 12 feet wide forms the water front, and there is sufficient depth of water here for the largest lake carriers. The fact that grain

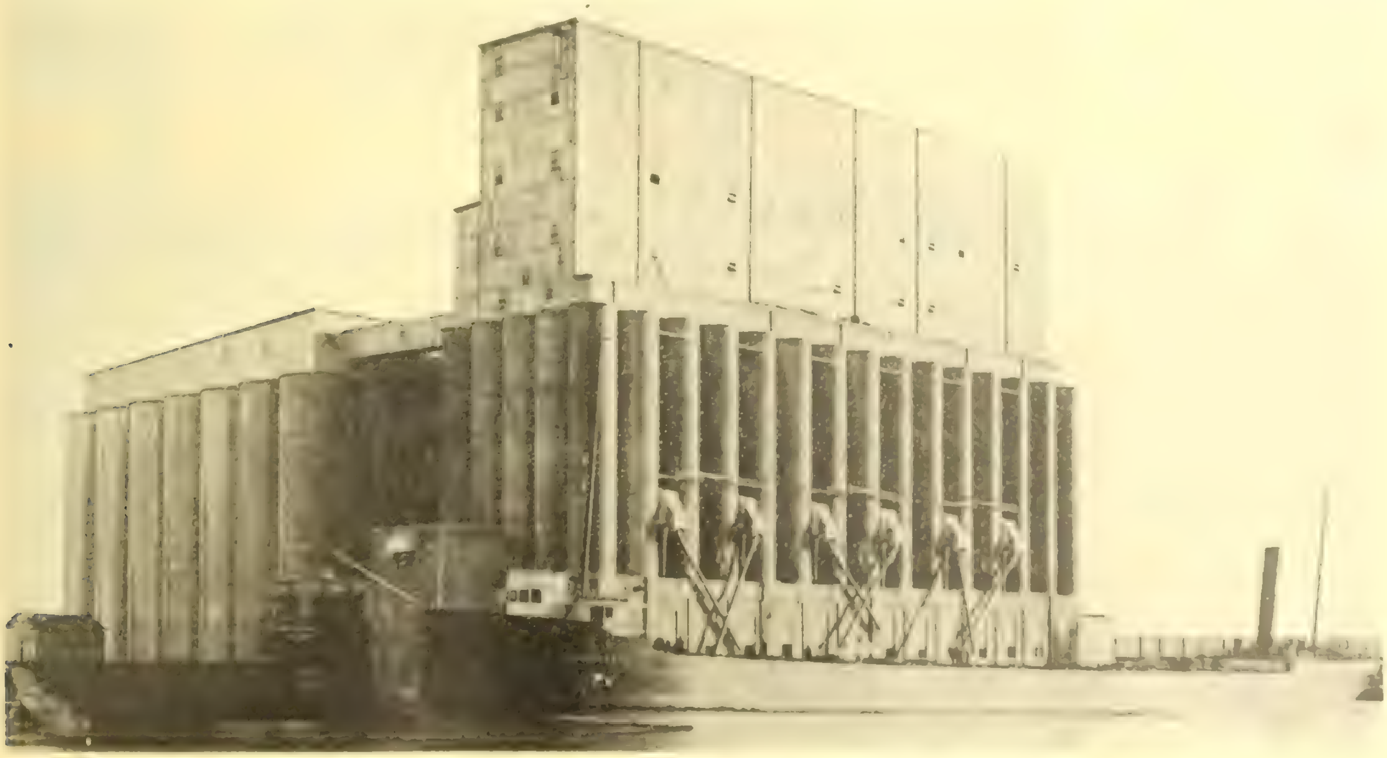


Fig. 1. Shipping side of the G.T.P. elevator at Fort William. Capacity 3,500,000 bushels.

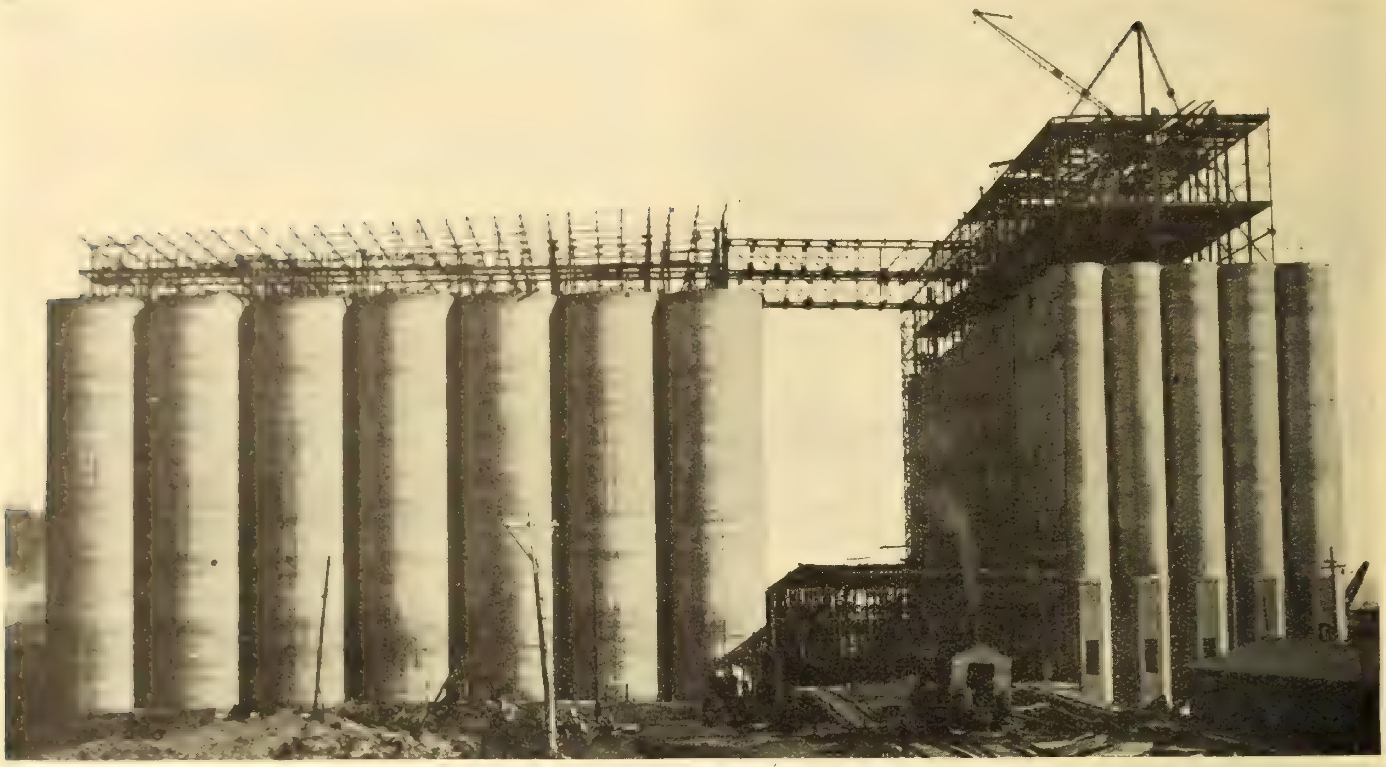


Fig. 1a.—Completed bins and steel frames of track shed and cupolas, G.T.P. elevator, Fort William.

can be delivered directly into vessels is a factor of great importance in relation to the efficiency of this type of elevator. In the case of terminal elevators at the seaboard (for ocean-going steamers) long conveyor galleries are usually necessary for the distribution of grain from the elevators, as the vessels carry a miscellaneous cargo and must lie at warehouse wharves in order to receive all classes of freight simultaneously. With the grain elevators on the upper lakes this condition is obviated, since grain generally forms the entire cargo of a steamer, and thus dock spouts (delivering directly to the vessels through dock hatches) may be utilized. This results in a great saving of expensive equipment and in time of loading.

The present completed section of the plant consists of the following: (1) a four-track receiving shed; (2) a working and cleaning house with 75 cylindrical bins 12 feet inside diameter and 79 feet high; (3) a storage annex of 2,750,000 bushels capacity, having 70 bins 23 ft. 3 ins. inside diameter and 95 ft. high; (4) a house for the electrical transformers and switchboard; (5) a drying plant. In both the working house and the

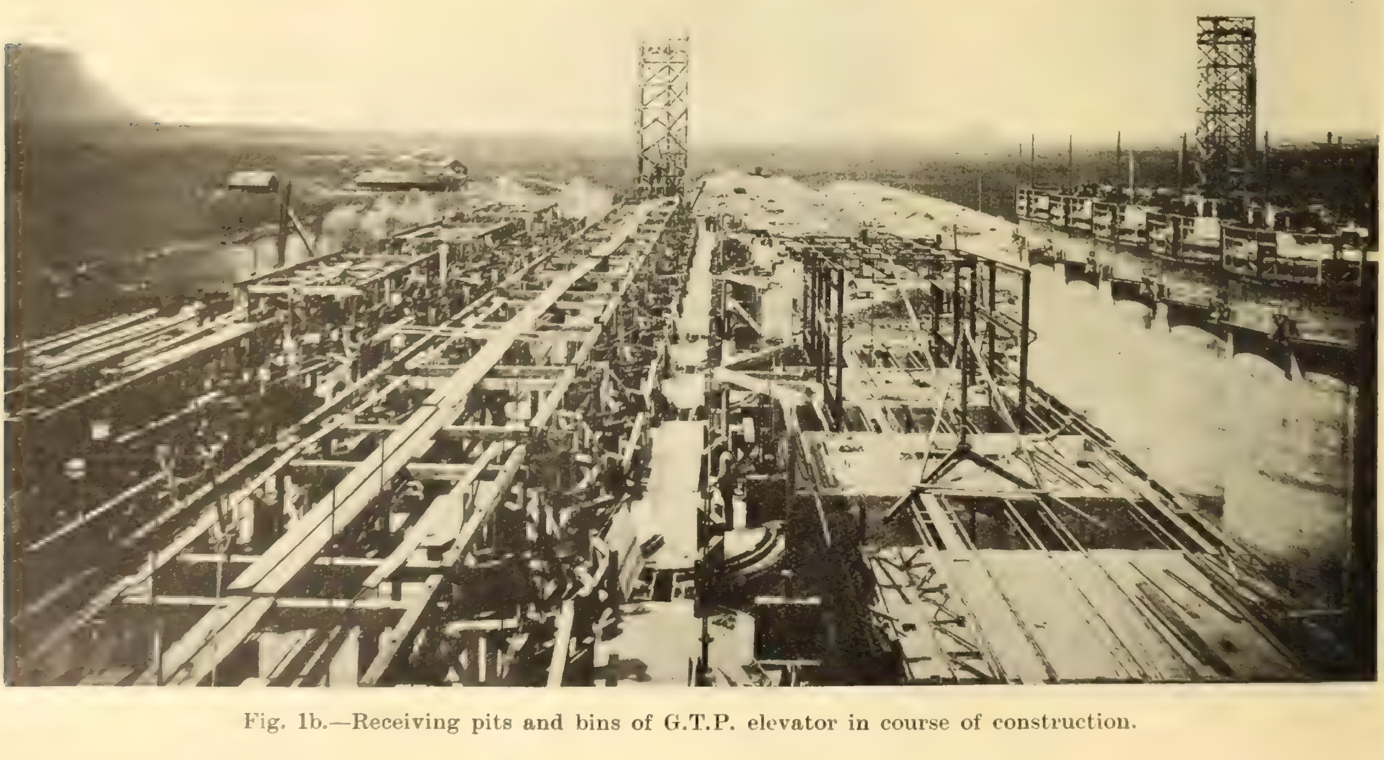


Fig. 1b.—Receiving pits and bins of G.T.P. elevator in course of construction.

storage annex the spaces between the main bins are used also for storage. The smaller buildings and the main structures from the bottom of foundation to the top of the bins are built of reinforced concrete. The cupolas of the working house and storage annex are of steel frame construction, with concrete roofs and floors, the roofs having a five-ply felt and composition covering. The doors are steel-covered, and sheet metal window frames glazed with ¼-in. ribbed wire glass are used throughout.

The forms for the cylindrical bins are of particular interest. They consist essentially of inner and outer staves 4 ft. high, held in place by built-up wooden rings. To maintain the proper space between these walls rigid yokes built of steel plates and channels are bolted to the forms. The latter are raised continuously as the work progresses and give a smooth surface without unsightly rings, breaks, or offsets. Another advantage in the use of these forms is that when the work is completed they may be taken down and used a second time. The construction of the yokes and jacks for the forms is shown in Fig. 6.

These circular forms were handled and raised by means of an ingenious device invented by Mr. R. H. Folwell and Mr. W. R. Sinks, of the contracting company (mentioned above). This is patented in both the United States and Canada. The essential element in the invention is a hollow jack screw (Fig. 6) through which is passed one of the vertical rods for reinforcing the concrete; the jack is made to climb this rod, and thereby raise the forms. In operation, a bar is inserted in one of the sockets in the cast head of the jack, and with this leverage the screw is turned. By turning to the right, the forms are lifted, and by turning to the left the jack itself climbs the rod, while the form remains stationary, supported by the adjacent jacks. By reason of the rod passing through the jack, the load is applied concentrically and thus any tendency of the forms to bind is eliminated. No delay is caused by the placing of additional vertical rods as these are merely inserted in the tops of the jacks. In this way, daily progress may be observed accurately by reference to marks on the rods, which will also assist in obtaining the precise location of the horizontal reinforcing rods and in keeping the forms truly level. The forms of the separate tanks, though constructed in sections, are tied together to prevent spreading from the pressure of wet cement by a system of horizontal rods attached from yoke to yoke. They serve to support the working floor.

The concrete was composed of Portland cement, sand and gravel, in the proportions of 1:2:4, mixed very wet. The aggregate varied in size from 2½ ins down to coarse sand. The various materials were handled by steel dump cars hauled by locomotives. The sand and gravel was dredged from Lake Superior by means of derrick scows with clam-shell buckets, and unloaded upon a temporary dock 2,000 feet lond constructed for the purpose. From the stock piles the materials were loaded into the cars by a locomotive revolving crane. There were two concrete mixing plants, one at either end of the elevator, and each had two concrete mixers. Here the aggregate was elevated to charging hoppers, where cement and water were added. The proper amount for a batch of concrete was then introduced into the mixer, and from there the concrete was poured directly into a large hoisting bucket in an elevator tower. The loaded bucket was then raised and emptied into a hopper above the level of the work. As the work progresses upward the hoist towers were extended and the hoppers raised. The concrete was distributed to the various sections of the work by means of concrete carts. With this equipment as much as 800 cubic yards of concrete were placed in one 20-hour working day, and a total of 60,000 cubic yards were handled.

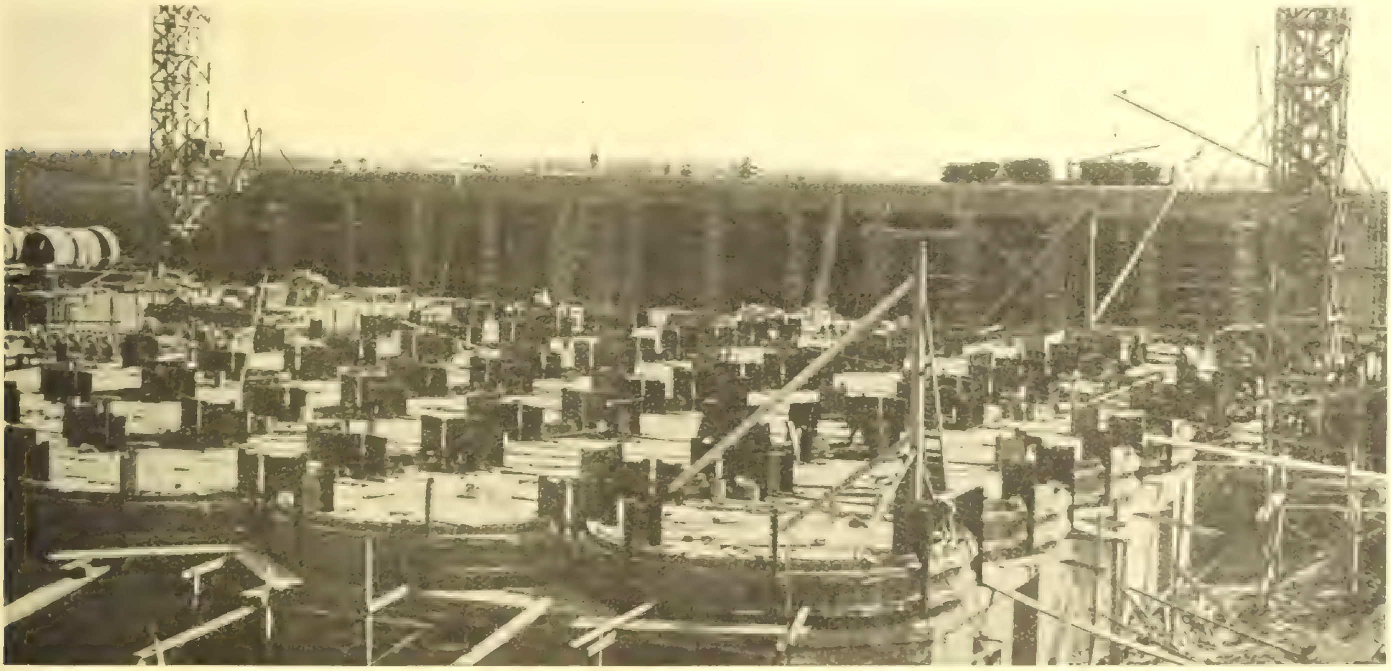


Fig. 2. Construction of concrete bins for grain elevator.

The reinforcement of the bins consisted of vertical rods and horizontal hoops of flat steel of varying widths and thicknesses. For the reinforcing of the concrete columns supporting the bins of the working house, a spiral of ½-in. steel wire forming a helix 41 inches diameter was used, supplemented by vertical rods. Round steel rods were used for reinforcing girders and floor slabs. Fig. 2 shows the concrete construction work in progress.

When a train of loaded grain [illegible]

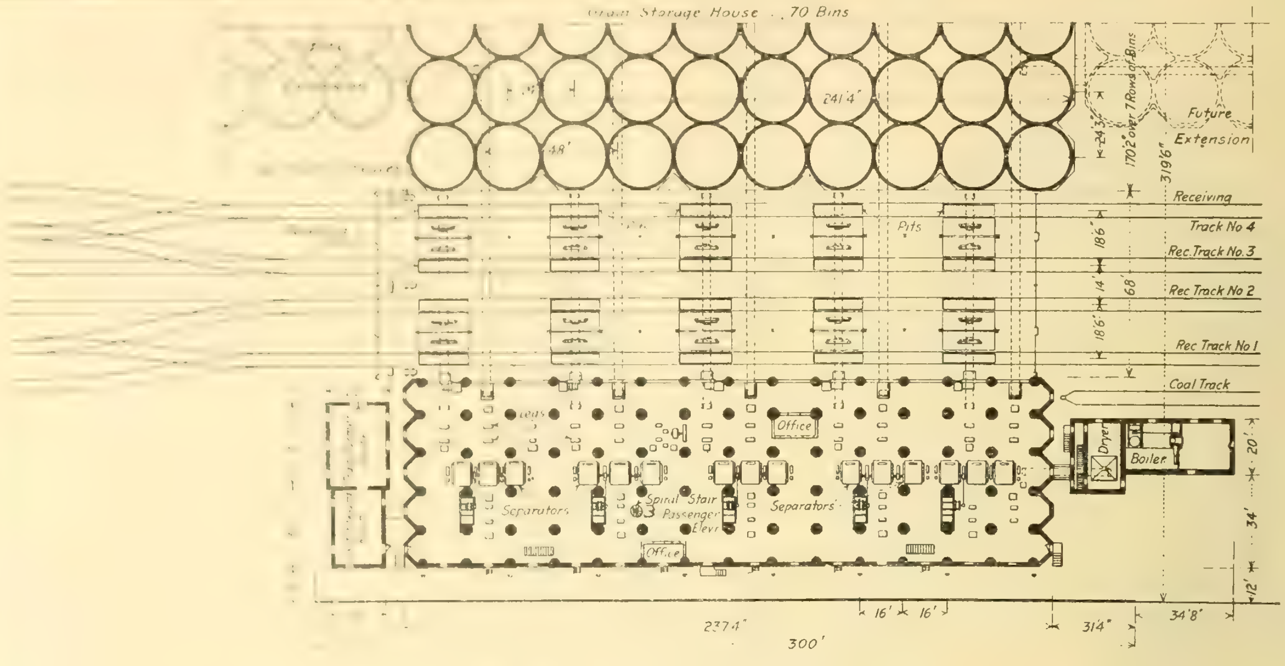


Fig. 3.—Plan of grain elevator.

any one of the four receiving tracks it is stopped with the first five cars over the five receiving pits. Much of the grain pours out when the car doors are opened; the remained is plowed out by large plows or shovels guided by men and hauled by cables on electrically operated drums. With the four tracks, 20 cars can be unloaded simultaneously, giving a receiving capacity of 500 cars per 24 hours. As soon as the five cars are empty, the train is pulled ahead five car lengths by a cable on an electric hoist or car-puller which is powerful enough to handle a 30-car train. This hoist is controlled from a position in which the operator has full view of the train.

Each track pit has a capacity of 2,000 bushels, and has a gate for delivering its contents upon a 36-in. lateral belt conveyor leading to the five receiving legs. The grain thus received may be sent to the storage bins by belt conveyors over-head or to the bins in the working house and then cleaned by machines in the first story below. Then it may be elevated again and sent to the storage bins, or it may be delivered directly to the steamers. If grain needs drying it may be delivered by spouts to the dryer plant from the working house. Grain from all storage bins is fed by gravity through hoppers upon belt conveyors which deliver it to the elevators in the working house. For reloading into the cars, there are five car spouts with forked delivery heads. For loading grain directly into vessels,

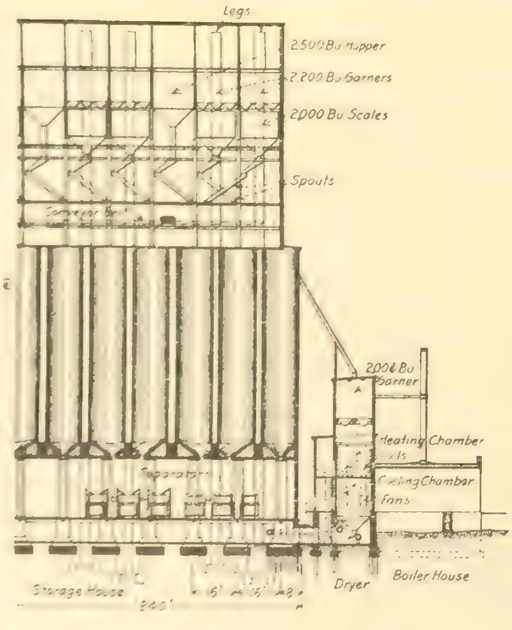


Fig. 4.—Part longitudinal section.

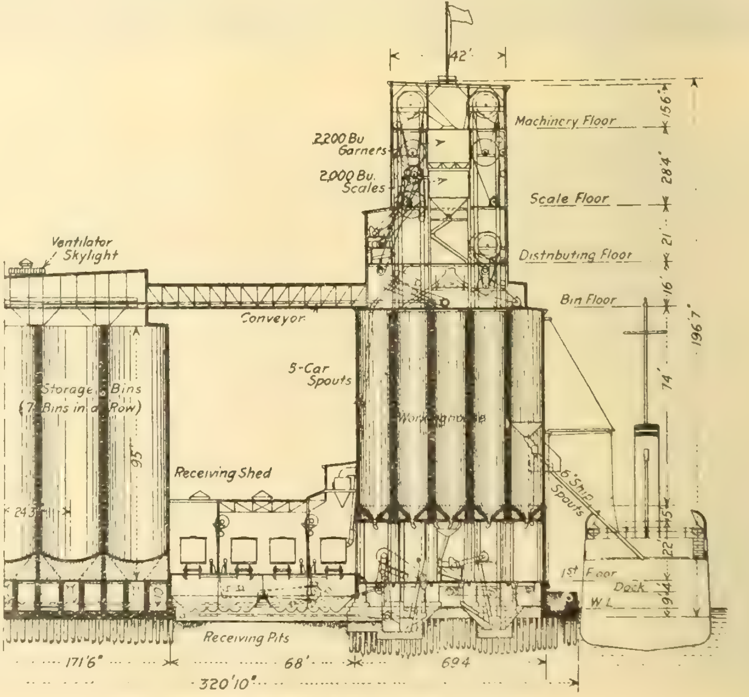


Fig. 5. Part cross section.

there are six dock spouts, each capable of delivering 20,000 bushels per hour.

In the cupola, there are 10 hopper scales of 2,000 bushels capacity, fitted with recording devices; each is served by an overhead garner of 2,200 bushels capacity. Fans and cyclone separators are used for the removal of dust from the various departments, and this is discharged into dust bins. An efficient and well balanced system of conveyors, elevators and spouts provides for the distribution and handling of grain from one part of the plant to another.

Electric power is used throughout, and current of 22,000 volts is delivered by the 22-mile high-tension transmission line from the Kakabeka Falls hydro-electric plant of the Kaministiquia Power Company. This is transformed and reduced to 550-volt alternating current. Individual motors are used throughout, and there are in all about 37 motors aggregating 2,500 h.p. Rope drives are used in preference to gearing in all cases, with the exception of the car-puller, which is equipped with heavy cast-steel gars. The lighting plant includes outdoor arc lamps for the wharf and tracks, and 800 incandescent lamps in the buildings. All wiring is laid in conduits, and all hanging lamps have flexible armored conduits and wire guards. There is a complete telephone system, in addition to speaking tubes, electric bells, and a system of red and green lamps at the receiving and shipping legs for signaling the operators. A passenger elevator is provided, and also a traveling belt elevator for the workmen. Steam for heating the dryer and the offices is supplied by a horizontal tubular boiler. For fire protection there is a complete equipment of hose and piping served by a 500-gallon pump directly connected to a 50-h.p. motor.

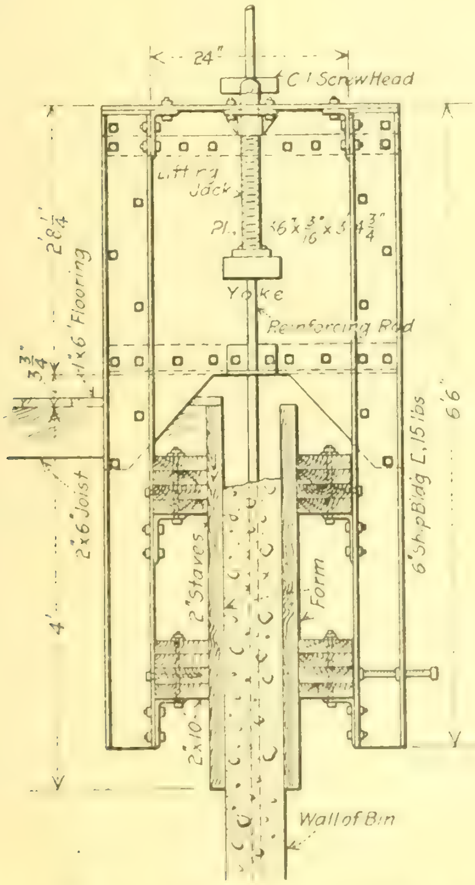


Fig. 6. Jack and yoke for supporting and raising the forms for the circular concrete bins. (R. H. Folwell and W. R. Sinks, Inventors.)

We are indebted to the Engineering News and to the contractors, the Canadian Stewart Company, for data and illustrations.

Canada's Zig-Zag Trade with the U.S.

There are a considerable number of loyal Canadians who find just cause for satisfaction in the continuous development of inter-provincial trade on east and west lines. These gratified sentimentalists, however, must often speak loudly to be heard above the rumble of heavy freight trains on north and south lines crossing the border between the two countries. It is noticeable in the building trade that many novelties in patented or secret processes, and products used in modern construction, come from the busy factories of the United States, while the raw material of which they are fashioned is to be found plentifully in this country. An actual illustration of Canadian trade on zig-zag lines was noted at the recent Cement Show in Toronto. Certain fireproofing blocks there shown, and used extensively in this country for partitions in new buildings, proved to be made in the United States of gypsum plaster from Canadian quarries. This gypsum, of the pure white quality, is shipped in the rock from Windsor, N.S., to New York, paying a duty of fifty cents a ton to the American government. It is there calcined and ground, sold to the partition-block manufacturers, and re-crosses the line as finished product, contributing another customs fee, this time to Canada. The east and west sentiment is reasonably strong among Canadian contractors and builders, but this zig-zag game is fascinating.

The Canada Car Company, Limited, of Montreal, is working on a contract to construct one hundred automobile cars for the C. P. R. This is quite a new style of freight car in this country. It is 36 feet long, 9 feet high, and the usual width. The special feature of the car is a large door at the end of the car, through which a full sized automobile can be driven conveniently. There is also the usual side door that may be used for loading and unloading ordinary freight.

The C. P. R. will open fifty new towns this year on branch lines completed last fall in western Canada. Last year forty were placed on the map and nearly all of these are developing into centres of commercial activity. To the company's progressive plan of expansion is attributable largely the increased immigration of Americans into Saskteechewan and Alberta.

High salaried positions are not reserved exclusively for Canadian city engineers. Mr. Howard Eliott, president of the Northern Pacific, was recently offered $100,000 a year to accept the presidency of the Missouri Pacific - and declined.

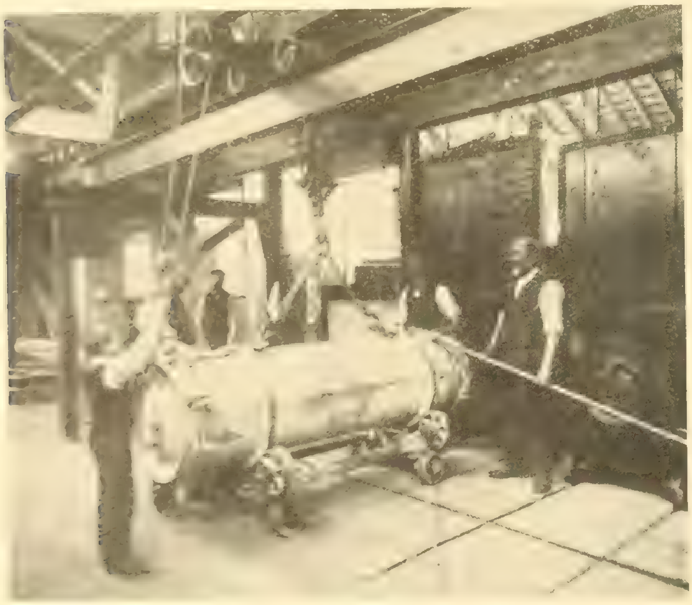
Judgment for $3,250 was given John A. Macdonald, a railway construction foreman, in his suit against D. R. McDonald, railroad contractor. This was reduced from $6,000 awarded at a preliminary hearing. Macdonald was injured in an explosion of dynamite at La Tuque.

The Sherardizing Process of Galvanizing

A Method of Metal Lath Protection, recently invented, calculated to revolutionize this class of work — Various Uses and Advantages

By C. W. Noble, Toronto

Any [illegible] of galvanizing, in order to be complete, must be prefaced by a discussion of corrosion of steel. Whenever two metals of different electric potential are in contact in the presence of an acid or salt solution, an electric current is set up and that metal which is electro positive as compared with its fellow, is attacked. The chemical reaction, and the electric current are apparently mutually dependent on each other for existence. An electric battery, for example, will remain indefinitely strong if the current is not allowed to flow. Yet as soon as the wires are brought in contact the chemical attack takes place and the zinc in the battery goes onward to destruction. In spite of this everybody knows that the chemical reaction causes the current instead of being the result of it.



Sherardizing Plant in Operation

The air contains small quantities of sulphurous and carbonic acid gases, the product of decay and combustion. The play of lightning throughout the atmosphere also produces small quantities of nitric acid. These gases, together with the moisture normally present in the air, form one of the elements of a battery. Commercial steel forms the other two elements. At first glance this seems impossible. The explanation is that the impurities in steel are never absolutely uniform in their distribution, and a very small variation in certain impurities, particularly manganese, makes considerable variation in electric potential. Whenever moisture having these gases in solution is brought into contact with steel, small electric currents are set up and a chemical attack, or in other words, a rusting of the steel, takes place.

This matter has been very carefully investigated by Dr. A. S. Cushman, of the United States Department of Agriculture, who investigated the corrosion of fence wire. He noted that frequently one wire in a fence would be badly corroded while parallel wires in the same situation would be clean. Often an individual wire would be corroded for a few yards and would be bright throughout the remainder of its length. He concluded that these rusted spots were caused by slight variation in impurities that made them electro positive as compared with the adjacent portions. Even a very slight variation in the metal is sufficient to localize the attack, and, as the action results whenever there is moisture in the air, or, in other words, is practically continuous, it soon shows appreciable results.

Now zinc, as compared with iron, is always electro positive. If zinc and iron, therefore, are in contact in the presence of a corroding agent, the flow of the electric current is from the zinc to the iron, instead of between the different portions of the iron, and the zinc is attacked while its fellow remains unscathed. The action is identical in the case of the fence wire where certain spots rusted and by so doing saved the adjacent portions. The only difference is that zinc is electro positive as compared with any commercial iron and the point of attack can therefore be definitely located, while if the rust is to be allowed to develop on the steel, only time can tell where it will first occur.

Superior to Painting.

Galvanizing consists of coating iron or steel articles with a coating of zinc which will shield them from rust by taking the attack itself. The zinc is always added after the article is complete, and its destruction does not therefore weaken the article itself, while a corresponding rusting might have serious consequences. The reason that galvanizing is a better protection than paint is the fact that the salts which cause the electric currents can pass through the scratches in the paint and thus start corrosion at all exposed points. Zinc, on the contrary, protects the steel, in its immediate neighborhood, even if it does not form a complete covering. It also offers a greater resistance to abrasion, and is not subject to decay as is vegetable oil used in making paint.

The first galvanizing was done by Cranford, in England, in 1846. The method used was the hot process. After the removal of all mill scale, grease and rust, the article to be galvanized is dipped in a bath of molten zinc. As it emerges, if the nature of the article permits, it is passed through rollers, or brushes, to remove the excess metal. By rapid cooling the zinc coating is given that bright spangled appearance which characterises this type of galvanizing.

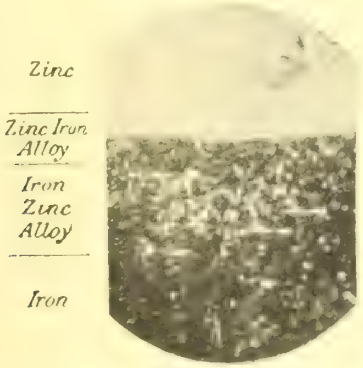
Electro galvanizing has been practised for about eighteen years. It is merely zinc electro-plating. The articles to be coated are suspended in a solution of zinc salts, in which also are suspended plates of metallic zinc. The plates and articles are then so connected with an electric current that the current will flow from the zinc plates to the articles through the solution. The plates then disintegrate and the zinc is deposited in the articles. When finished, the coating has much the color of aluminum and is very easily distinguished from the hot galvanized.

An English Invention.

Sherardizing, or dry galvanizing, was first invented by Mr. Sherard Cowper-Coles, of London, England, about six years ago. A large number of plants are now operating in England, the United States, and Canada, and it has already replaced the old process for certain lines of work. As the method is entirely new it will be described at considerable length.

It is very similar to the old process of case hardening, by which the outer portions of steel castings are impregnated with carbon by baking in charcoal dust and thus hardened. The articles to be sherardized are first cleaned from mill scale and packed in zinc dust. They are then baked for four or five hours at a temperature of about seven hundred and fifty degrees. During the process the retorts in which the articles are packed are rotated from time to time to insure perfect contact with the dust. On removal and cleaning the articles are found to be covered with a frost-like coating of metallic zinc. If this is removed it will be found that there is no distinct surface between the zinc and the iron. Instead, the metal passes through graduations of pure zinc, zinc-iron alloy, iron-zinc alloy, and pure iron. The result, therefore, except for the addition of the pure zinc on the outside, is very much like the case hardening, for in this process the outer surface of the steel is converted to an alloy of the material in which it is baked.

The explanation of all this is very interesting. Zinc dust is not powdered zinc; for zinc, as everybody knows, cannot be pulverized. It is the sweepings from flues through which zinc vapors are passed at the smelters. The particles are very minute. It requires about fifty thousand of them in contact to make a row an inch long. Chemically, the dust is a mixture of metallic zinc and zinc oxide. When placed in a test tube, and heated, the dust will begin to give off zinc vapor at a temperature of about two hundred and fifty degrees and the vapor condenses as metallic zinc about the mouth of the test tube. This is a very curious matter as the melting point of zinc is as high as seven hundred and eighty degrees and the vaporizing point is of course much above that.



Magnified Cross Section through Sherardized Surface

The explanation removes the difficulty. Each zinc particle consists of a minute globule of metallic zinc covered with a coating of zinc oxide. It was to all intents condensed from a gas to a solid without the intervention of a liquid state. The atoms in the zinc globule have a tendency to crystallize but were condensed without having time to do so and are held in their uncomfortable position by the coating of zinc oxide. A similar condition exists in the small portions of unannealed glass called Ruperts drops, which are used in a laboratory experiment. When pricked or pinched they fly into a thousand pieces on account of the sudden release of the internal stresses. Similarly these particles of zinc dust under the influence of only a moderate heat explode into zinc vapor.

When packed in masses in the retort the strength of the oxide envelopes is reinforced by contact with the neighboring particles and explosions at low temperature do not occur. When it is in immediate contact with the steel, however, the chemical affinity between the two elements overcomes the constraining effect of the packing. The vapor is then formed and condenses on and within the steel. It is a curious fact that the zinc is never condensed on the inside of the retort itself. This is because the retort is hotter than the enclosed zinc dust and the vapor which always will condense on the cooler surface is therefore re-absorbed back into the zinc.

In the old style of galvanizing there is an actual surface of contact between the zinc and the steel. The difference in electric potential in crossing the surface is about one-half volt. The electric current and consequently the chemical attack on the steel is in proportion to this difference. In the sherardized coating the total differences in the electric potential is accomplished by a gradual variation while passing through the alloy. The current resulting from the chemical attack occurs, therefore, only between the pure zinc and the outer zinc-iron alloy, between which there is only a slight difference in potential. The rate of attack on the zinc is correspondingly slow. When the pure zinc is entirely removed the alloy itself acts as a protection. In fact, the alloy resists the attack much better than pure zinc, probably because the difference in potential between the different portions of the alloy is less between the alloy and the zinc.

Sulphate of Copper Test.

The usual test for galvanizing it what is known as Preeci's or the sulphate of copper test. The article to be tested is immersed in a concentrated solution of sulphate of copper, at the usual room temperature of seventy degrees. A deposit of metallic copper is slowly formed on the zinc. After leaving the articles one minute in the solution it is removed and the copper wiped off. The process is continued until all the zinc is destroyed. This is indicated by the fact that the copper cannot be removed from the underlying iron by wiping.

Another comparison can be made by placing the bits of galvanized steel in a copper sulphate solution to which a little sulphuric acid had been added. This solution is what is used in the gravity cell. The hot and electro galvanized lath samples will boil off hydrogen very rapidly. The zinc will totally disappear and the formation of hydrogen consequently ceases in a very short time. The sherardized sample will appear almost inert. At first the bubbles which rise are so fine as to appear almost like a wisp of mist, but as the alloy is reached they become too small to be seen and the only way one can detect the action is by the movement of the liquid over the sample. This is shown by the slow rise impurities. The time of ending of the action is always uncertain, but it is very much longer than is the case with the other types.

An Interesting Test.

M. J. H. Burn Murdoch reports a severe test on sherardizing. He cut a steel jack chain in two and had one part sherardized and the other part hot galvanized. The hot galvanized coating was unnecessarily heavy as there was no way by which the excess zinc could be wiped off. Both chains were hung side by side off the end of a wharf in sea water and were observed from time to time. When finally removed the hot galvanized coating was entirely gone and the links beneath it were so badly corroded that many of them could be broken in the fingers. The zinc on the sherardized coating was entirely gone and the link had the blue black color that characterizes the alloy. Only a few spots had begun to show rust. There were no pits and no scale, and the strength of the chain was as great as ever.

The sherardizing process costs less than any other type of galvanizing. In hot galvanizing a large portion of the zinc is lost in dross, and in electro galvanizing the anodes crumble so that only about one-half the zinc actually goes into solution. In sherardizing, on the other hand, the zinc is all used. The cost per pound, too, of the zinc in the form of dust is less than when bought in the form of spelter or anode plate.

The sherardizing process costs less for heat than hot galvanizing, and can be started at any time without the delay incident to melting up a pot of spelter. The cost of the heat for sherardizing is also less than the cost of the power for electric galvanizing. The process must be well done or it must not be done at all. This is because the zinc dust is such a poor conductor of heat that the process has been going on for some time at the outside of the drum before it starts at the centre, and, conversely, after removing the drum the process continues at the centre after the outside of the drum is comparatively cool. This is in marked contrast to electro galvanizing which gives color with a very short immersion and long before sufficient zinc has been deposited to insure adequate protection. All the processes depend for their success on the perfect removal of mill scale, but the presence of oil which is fatal in the case of the other processes is no hindrance to sherardizing.

Various Uses.

The process is being very generally adopted for situations which are badly exposed to electrolysis where paint and the older types of galvanizing have not proven satisfactory. Cross-arm braces and insulation pins for telephone are now largely sherardized. So also are the castings by which trolley wires are suspended. An American firm manufacturing sherardized conduit pipe now supplies the greater portion of that trade south of the line. High voltage transmission towers are also treated. The British Admiralty are now using sherardized malleable castings for many situations, such as boat fittings, where bronze was formerly used. A sherardized coating, when buffed, takes a polish very much like nickel. Stove trimmings made thus are coming very much into use.

Another use for the process which will soon become general is the protection of metal lath. Hard wall plaster while setting up generates electric currents and thus attacks any exposed metal in a manner very similar to electrolysis. The action of the plaster of Paris while crystallizing, is similar in kind, although less in degree, to the action of the salts in a dry battery. The older types of galvanizing, if done efficiently, have proven too expensive for any but the very best work. Sherardizing, which is more efficient than the older types, is low enough in cost to have an extended use.

Exhibits at the Toronto Cement Show

Features of Interest to the Engineer, Architect and Contractor—Convincing Proofs of the Wonderful Development of the Industry

As will be seen by the illustration published herewith, the Ideal Concrete Machinery Company, of London, Ont., had a most attractive exhibit. The company's products were favorably commented upon alike by the general public and the man actually engaged in contract work. Considerable interest centred in a machine for tamping the mixture in moulds, this being a wonderful improvement over the old style of hand tamping. Labor is always erratic even at its best, and as the quality and strength of the concrete block depend greatly upon the amount of tamping it receives, the value of this machine can be readily appreciated. The Ideal people also make an excellent line of concrete block machinery. The illustration shows the firm's exhibit at the Cement Show, adjoining the booth of the "Contract Record."

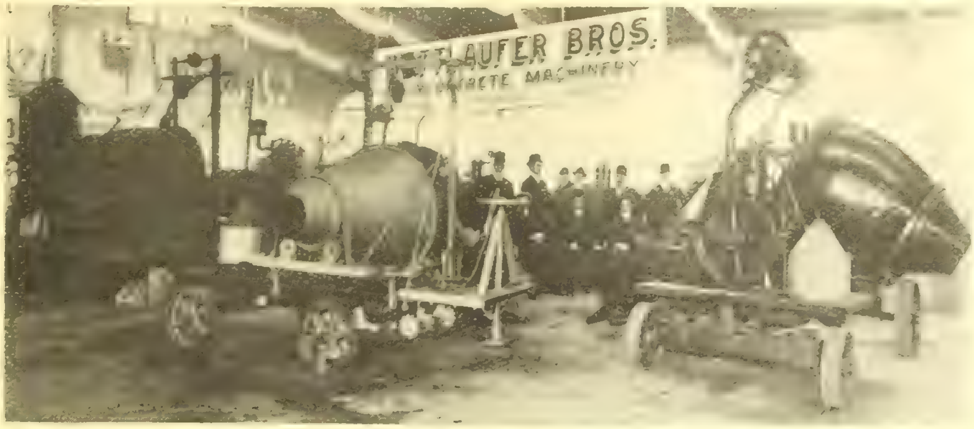
There was always a great attraction in the exhibit of the Canada Cement Company. That corner of the building never failed to draw its numbers. The exhibit was one of the largest and showed much careful planning. At one end of the booth, forming a striking contrast to the pieces of concrete for building purposes, was a section of a model home, showing some of the artistic effects that can be produced with concrete. A novel feature was a fireplace of simple design yet attractive, and blending perfectly with the color scheme and general tone of the room. The booth

Exhibit of the Ideal Concrete Machinery Company, Limited, London, Ont., adjoining the "Contract Record" Booth

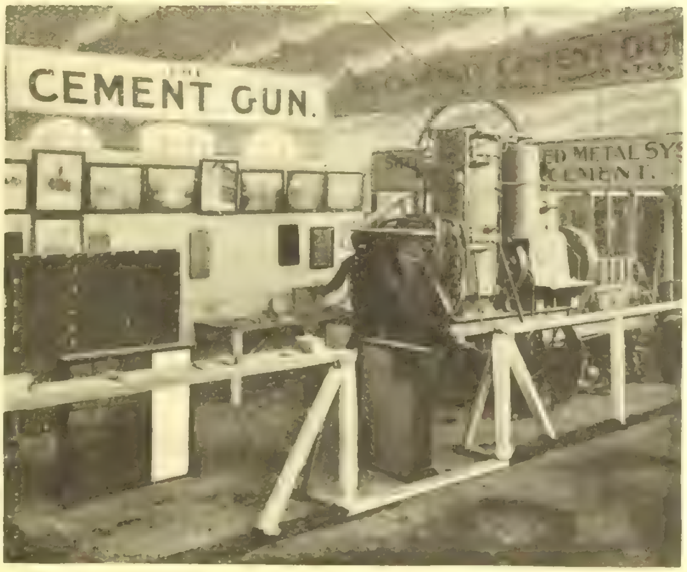
Centres of Interest at the St. Lawrence Arena, Toronto

Exhibition of the Canadian Cement and Concrete Association

March 6-11, 1911

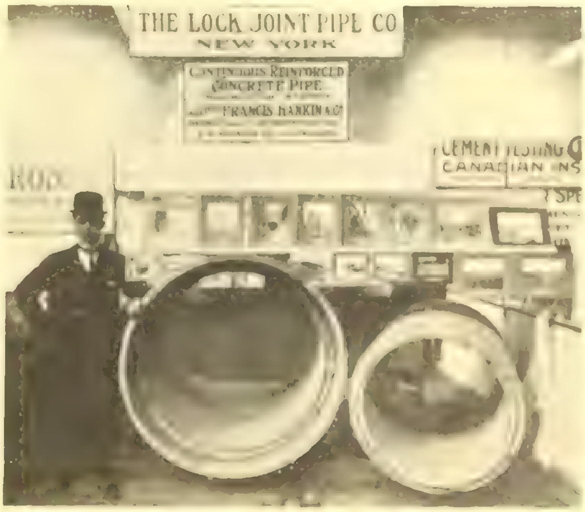


Wettlaufer Bros., Toronto



Canadian Cement Gun Company (Steel & Radiation), Toronto

Canadian Inspection Company, Limited, Toronto



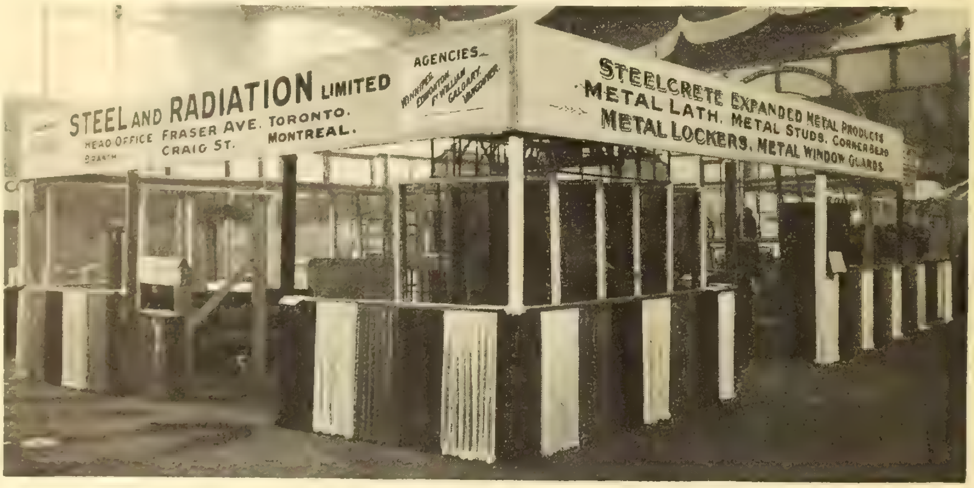
Lock Joint Pipe Company, New York

Centres of Interest at the St. Lawrence Arena, Toronto

Exhibition of the Canadian Cement and Concrete Association

March 6-11, 1911

London Concrete Machinery Company, Limited, London, Ont.


STEEL AND RADIATION LIMITED
HEAD OFFICE FRASER AVE. TORONTO.
CRAIG ST. MONTREAL.
AGENCIES
STEELCRETE EXPANDED METAL PRODUCTS
METAL LATH. METAL STUDS. CORNERBEAD
METAL LOCKERS. METAL WINDOW GUARDS

Steel & Radiation, Limited, Toronto and Montreal

National Roofing Company, Tonawanda, N. Y.
(Toronto Agents: Allen General Supplies Company)

also had a great drawing card in the shape of a miniature cement mill, complete, and in operation. Each visitor was shown the details of cement manufacturing, and on leaving, was given a tiny bag of "Canada" cement as a souvenir.

Wettlaufer Bros., Toronto, had an up-to-date line of concrete mixers and machinery in operation. The firm were excellently located and their was one of the largest exhibits. They are well known in the eastern market, a statement which is proven by the fact that in the city of Toronto alone during the last three season they have sold 75 concrete mixers and 30 hand mixers. Their half-yard heart-shape mixer with automatic lift hopper, replete with new improvements for discharging the drum, elicited much favorable comment from the trade.

A complete cement testing laboratory was the exhibit of the Canadian Inspection Company, Limited, which was in charge of the vice-president of the concern, Mr. L. J. Street, and Dr. Herlitschka, director of the company's laboratory. The Canadian Inspection Company are establishing a testing laboratory in Winnipeg and the apparatus shown was that which is about to be shipped to the western capital. In the investigations of structural material made by this company three different machines are used for each test, thus insuring absolutely reliable analyses

The Lock Joint Pipe Company, 165 Broadway, N.Y., had an effective exhibit containing a number of samples of their continuous reinforced concrete pipe. This firm is one of the best known in the Canadian field. It will be remembered that they obtained the contract for the pipe used at the Toronto filtration plant. Their representatives gave us a copy of an attractive booklet, illustrating the various uses to which this material has been put on important construction throughout the continent. This booklet, which may be obtained upon application to the Lock Joint Pipe Company, also contains constructional information pertaining to the Meriweather system that should be of interest to the trade. They are represented in Canada by Francis Hankin & Company, of Montreal and Toronto; F. H. McGavin & Company, Winnipeg, and in British Columbia by Pacific Coast Lock Joint Pipe Company, Seattle, Wash.

The exhibit of the London Concrete Machinery Company, Limited, London, Ont., furnished conclusive evidence of the enterprise and progress of this firm. It was not only one of the largest exhibits of the kind we have yet seen, but also one of the best. It comprised in part a complete line of concrete machinery in operation. Among the most popular of the company's products may be mentioned the London automatic batch mixer, a machine which is claimed to have the largest sale of any mixer manufactured or sold in Canada. The No. 1 style has a capacity of 50 yards a day and the No. 2 a capacity of 75 yards a day. As an all round money saver in the cost of producing the concrete and the expense of the machine itself, it is an excellent proposition. The London standard batch mixers, made in four sizes and furnished with any equipment, are also a popular line with contractors. In addition to a full line of cement working tools the company also manufacture face down block machines, cement brick machines, drain tile machines, ornamental moulds, sewer pipe moulds, etc. Their headquarters are 19 Marmora street, London, Ont. Branches are located in Vancouver, Winnipeg, Calgary, Montreal, Halifax and London, Eng.

Eadie Douglas, Limited, of Montreal, Toronto, Ottawa and Winnipeg, had an exhibit of considerable interest. Of the samples shown may be mentioned those demonstrating the possibilities of Terrano floors. This flooring is strongly recommended for public buildings, hotels and large residences where a fireproof, sanitary and durable floor of good appearance is required. Ceresit, an efficient, economical waterproofing, another of the Eadie Douglas specialties, came in for a good deal of investigation, while "Preservo" applied to a canvas sheet in the company's exhibit had rendered the material absolutely waterproof and able to hold water indefinitely. Keystone gypsum blocks were another noteworthy line. The company are also agents for Burmantroft's terra cotta. In this connection it is interesting to note that they have secured contracts for several buildings for the Toronto General Hospital.

The Ottawa Silica Company, of Ottawa, Ill., showed samples of their silica sand, which they claim to be the best for facing cement blocks, artificial stone, cement and stucco work. This sand is derived from the formation of St. Peter's quartzite. It is white in color, and a chemical analysis shows 99.90 per cent. pure silica.

The space allotted to the Canadian Cement Gun Company, subsidiary to Steel and Radiation, Limited, Fraser avenue, Toronto, was well patronized throughout the whole meeting. The novelty of the exhibit appealed to the non-technical man as well as to the engineer and contractor, the imagination of the former being tickled at the idea of a machine which literally shoots cement on to surfaces and creates a solid wall "while you wait." A detailed description of the cement gun was published in our last issue. To this we can only add that the machine is equally applicable to larger construction work and that it handles equally effectively lime, gypsum, cement and other plastic materials. It is held that there is almost no limit to the field for the cement gun process. A few of the many practical uses to which it may be applied are foundation work and waterproofing below grade, coating steel to prevent corrosion and rust, covering wooden buildings, sidewalk construction, coating water pipes, also railroad tunnels and highway bridges, and the giving of fire retardent treatment to the interior and exterior of combustible buildings.

The cement gun will be placed with subsidiary companies throughout the country under the direction of the Canadian Cement Gun Company, Limited. For information or estimates address the Canadian Cement Gun Company, care Steel & Radiation, Limited, Fraser avenue, Toronto.

Steel & Radiation, Limited, of Toronto and Montreal (head office Fraser avenue, Toronto), had an excellent exhibit which deservedly came in for a good deal of attention. One of their specialties which appealed particularly to engineers and contractors was a testing frame in operation. Reinforced concrete slabs and beams were tested from day to day throughout the Show. The company showed a large range of expanded metal and concrete reinforcement, also expanded metal lath and steel studding partitions, both solid and hollow. Their expanded metal lath is specified by leading architects for many uses, chief among which may be mentioned fireproof ceilings and walls, also beam and column covering; fireproofing stairway, elevator and dumb waiter enclosures; fireproofing eaves, cornices, etc. Other features of interest were suspended ceiling work; fireproof columns and beams; expanded metal lockers; solid steel sash, recommended particularly for factories and industrial buildings of all kinds; also solid steel casements for high-class residence work, office buildings, etc. The 'Fenestra" steel window sash shown by this firm has been used in many of the most important commercial buildings [illegible] the country and also on the various hydro-electric power stations throughout Ontario. The exhibit was in charge of Mr. W. F. Adams, chief engineer, and Mr. A. [illegible], general sales manager. The firm is much gratified at the numerous enquiries received throughout the exhibition. They regard this as infallible evidence of a good season ahead.

The [illegible] portable saw bench and wood worker was shown by the American Sawmill Machinery Company, of Hackettstown, N.J. This is a self-driven, portable and yet rigid machine, designed to stand hard continuous service, and as such it should be a usefuladjunct to any contractor's equipment. It is adapted particularly to the use of engineers, contractors and builders, and is intended to be used right on the job for a variety of light and medium mill work. Catalogues and detailed information will be furnished on request.

The National Roofing Company, of Tonawanda, N.Y., were represented by their Toronto agents, the Allen General Supplies Company, 140 Wellington street west. Samples of Security asphalt roofing furnished conclusive proof of the excellent qualities of this material. "Security" roofing is made in three styles of surfacing: white sea-gravel, coarse feldspar rock and fine feldspar rock.

It can also be furnished with burlap insertion for siding or roofs over half pitch. One of the principal advantages of Security roofing is its 6-inch asphalt cement welded joint. Of other lines belonging to the National Roofing Company may be mentioned Retaw roofing, Asphaltus roof covering and Natroco paint.

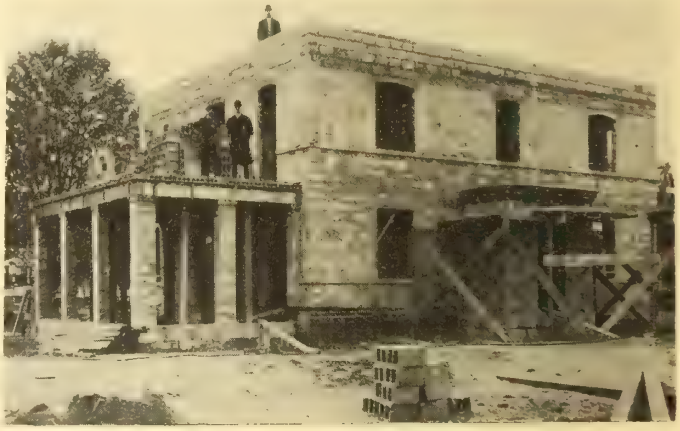
The Blystone batch mixer, shown by the Blystone Manufacturing Company, Cambridge Springs, Pa., appealed to us as one of the most effective machines of this kind we have yet seen. The Blystone mixer can be filled and discharged while in motion. Its rapid operation and the thoroughness of its mixing are the chief points in its favor. It is of simple construction, is easily cleaned, and requires only a 2 h.p. engine or motor to operate it.

The Koehring mixer shown by the Canada Foundry Company, Limited, Toronto, is well known to concrete workers and a detailed description of the machine is unnecessary. Another of the company's lines is the Koehring excavating loader, the advantages claimed for which are that it is self-contained, easily transported, adaptable to excavating cellars and trenches, and grading and loading materials into wagons or cars. Special catalogues will be furnished by the company on request.

Exhibit of the Canada Foundry Co., Ltd., Toronto

W. D. Beath & Son, Toronto, agents for the American Steel & Wire Company, had plenty of enquiries in regard to their triangle mesh concrete reinforcement. The continuous action of this reinforcement over the beams, and the methods of laying, were well illustrated in an effective picture screen showing a 15-storey commercial building in course of erection. The scene was from an actual photogroph taken in New York City. An interesting booklet containing reports of various tests of concrete reinforced with triangle mesh may be obtained on application to Messrs. Beath. The principal claims advanced on behalf of this material, we might say, are that it provides an even distribution of the steel, reinforcing in every direction; that it gives a perfect mechanical bond; that its application can be made at the minimum cost, and that it is easily handled.

Concrete hollow tile, made by the Pauly patented system, was the chief item of interest at the booth of Mr. Kennedy Stinson, of Montreal, who is the sole proprietor of the Concrete Structural Tile Company, of Montreal. Among the plants operating under the above system may be mentioned the Montreal Concrete Tile Company, Limited, Montreal; Perfection Concrete Company, Limited, Winnipeg; Edmonton Concrete Company, Limited, Edmonton; Ritchie Contractors' Supply Company, Vancouver. These structural tiles are now being used very extensively. Their popularity is due to their inherent and exclusive qualities. They have been successfully employed in every class of building from farm buildings and residences to factories, commercial and public buildings. They are made in all sizes and shapes and are at once effective and economical. Samples of Medusa products handled by the Stinson-Reeb Builders' Supply Company, Limited, Montreal, were also shown at this booth.



Concrete Hollow Tile in Residence Work

Clarence W. Noble, 117 Home Life Building, Toronto, showed samples of Herringbone metal lath, trussed beam fabric reinforcing and also twisted bars for reinforcement. Mr. Noble was kept busy explaining the superiority of sherardized Herringbone lath. A complete description of the sherardizing process will be found elsewhere in this issue.

The Concrete Form & Engine Company were represented by F. S. Freer, who showed models of the company's collapsible steel culvert forms and explained the manner in which they are used in the construction of culverts, conduits, small bridges and sewers. Mr. Freer informed us that there was an excellent demand for the forms and that a number of enquiries had been received from readers of the "Contract Record." A detailed description was published in our issue of March 8th.

Chillas-Black, Limited, Mail Building, Toronto, showed samples of paints, enamels, varnishes and damp-proofing compounds. The "R.I.W." damp resisting paints manufactured by Toch Bros., New York, and handled by Chillas-Black, Limited, will need little introduction to the trade. Other lines of interest were Toxloxpore and Toxement. The former is a colorless liquid, which, when applied to the exterior surfaces of walls, renders them waterproof and prevents their disintegration. Toxement is a waterproof material in the form of powder, which, when mixed to the extent of two per cent. of the neat Portland cement used, will absolutely waterproof concrete for floors, foundations, etc. It is claimed to produce a distinct chemical reaction between cement and itself which physcially fills up all voids.

The Standard Paint Company, of Canada, Limited, Montreal, showed samples of Ruberoid, P. & B. building and sheathing papers, preservative coatings and other of their products. The qualities of Ruberoid were effectively demonstrated in samples of that material laid on the roofs of the A. A. Griffing Iron Company (now the American Radiator Company), Jersey City, 17 years ago. The qualifications for foundry roofing are far more exacting than for a warehouse or for a building of similar character, and the excellent conditions and life of the sample of Ruberoid furnished convincing evidence of its capabilities. J. L. Vokes & Sons are Toronto agents for the Standard Paint Company.

The Lehigh friction clutch, and a pulverize fuel economizer were the lines shown by the Lehigh Clutch Company, Catasauqua, Pa. The Lehigh clutch is very powerful and readily adjustable, and the fuel economizer for burning pulverized coal is a most efficient apparatus. The Lehigh clutch is especially adapted to high speed and is designed for electrical drives and any machines where a quick acting, powerful and safe friction clutch is required. The company's representative, Mr. C. H. Wolf, Jr., gave us a copy of a letter from Dr. Otto Schott, chemist, of Heidelburg, Germany, in which he states that it should be advantageous to every cement company to use the company's fuel economizer and that he regards the apparatus as being a distinct improvement on that used in Germany.

The Kent Mill Company, 170 Broadway, New York, showed the Maxecon mill, which is claimed to be unequalled for grinding any hard or soft friable materials, such as cement, limestone, ores, and so on. The Maxecon pulverizer is claimed to combine the highest efficiency with the greatest durability. Its special advantages are that it is simple in construction and economical in operation, that no special foundation is required, that it is automatic throughout and that it entails the minimum amount of repairs.

C. S. Wert, Kendallville, Ind., showed the Perfect brick machine, described and illustrated in our issue of March 8. The Canadian market for this machine is continually improving and doubtless there will be a still further demand when a branch factory is established here. The "Perfect" has a capacity of over 1,000 brick an hour. It retails at $125.

Mr. L. V. Thayer, president of the Peerless Brick Machine Company, Minneapolis, Minn., who has become quite popular among Canadian cement men, was on hand to demonstrate the merits of the Peerless cement brick machine. The "Peerless" is operated by one man and has a capacity of 12,000 a day. It is a marvel of simplicity and durability and no better point can be made in its favor than the ready sale it finds in all parts of the country.

The exhibition booth of the Trussed Concrete Steel Company of Canada, Limited, Walkerville, Ont., was made of Hy-Rib and cement mortar—a most effective demonstration. Hy -Rib and self-centering for floors, roofs, partitions, etc. It consists of a perfect steel lath surface stiffened by rigid high ribs. The ribs and the lath are manufactured from a single sheet of steel, making it a complete unit of lath and studs. The material effects a great saving in the cost of building work as it does away with extensive field labor and centering. Samples of this and various other lines carried by the company were shown. Among the latter may be mentioned rib metal which is made of the best open hearth steel and is used for reinforcing cement floors, roofs, cisterns and similar work; also rib bars for columns, floors, slabs, and so on, and the United Steel Sash embodying all modern ideas in fireproof window sash. The merits of Trus-Con exterior wall finishes for waterproofing and finishing concrete were also demonstrated.

Alfred Rogers, Limited, Toronto, selling agents for the independent cement companies, had a most attractive booth which afforded many of the exhibitors and their friends a haven of retreat from the clamour of their own exhibits. Indeed the booth, bedecked with evergreens and palms, would have been a credit to the Horticultural Building of the Canadian National Exhibition. The representatives of the firm had numerous enquiries in regard to shipments for the coming season. Mr. Alfred Rogers, who spent a great deal of time at the Show, had his usual genial smile for the cement men, and that in itself brings business. An ingenious device, known as the Curry bag tyer, demonstrated at the Rogers booth, elicited much favorable comment. The wires are crossed on the neck of the bag. The slide handle is pulled back and the bag is then tied up securely with the loops supported ready for untwisting. This tyer has already been adopted by a number of the leading cement and plaster companies. Its use effects a considerable saving inasmuch as unhemmed bags may be used. A further advantage is that each package of cement is practically sealed.

"Hercules" waterproofing cement, and cement strengthening and waterproofing compounds were featured at the booth of the Ontario Lime Association, Toronto. Here also were shown samples of Crown gypsum plasters manufactured by the Crown Gypsum Company, Limited, York Mines, Ont. (Sale office, 24 Yonge Street Arcade).

The Meaford Wheelbarrow Company, Limited, Meaford, Ont., had an up-to-date line of steel tray wheelbarrows, both with wooden handles and tubular iron handles, adapted to the requirements of cement workers, contractors and others.

The "Little Giant" brick machine was shown by the LaGrange Specialty Company, LaGrange, Ind. The features of this machine are its simplicity and compactness. It makes plain or fancy brick and is claimed to effect a saving of one fifth of the material used.

The Gearless cement brick machine was exhibited by the Gearless Company, Gloversville, N.Y. The advantages claimed for the Gearless are durability, simplicity of operation and low cost. Either a wet or dry mix may be used, and it is said that the machine, with the same labor and cement, produces 1,000 more brick per day than other [illegible]

Winnipeg's Building Programme

An Outline of the More Important Work for the Season Railway Companies Active -- Labor Steady

Office of the Contract Record,
March 15, 1911.

[illegible] weather for the past week has had the [illegible] architects and builders to the realization that the season is close upon them. In consequence there are a number of important plans in the air. In fact within the next few weeks actual work will be started on several big projects which will run into huge sums. Unless there is trouble in the financial world and with the labor organizations [illegible] in Winnipeg cannot help but exceed all past records.

A brief sketch of what is now in hand may be of interest to readers of the Contract Record. The provincial government has let the first contract, that of the administration building, for the group of buildings which will be rushed to completion to accommodate the new agricultural college in St. Vital, a few miles south of the city. The expenditure on this work alone will amount to over a million dollars, and the first gang will be put to work this week.

Along with this work comes the question of providing street car accommodation, and several companies are in the field for charters for lines through the municipality, which will connect the college either with the city direct or with the existing city lines. Lines have been planned for both sides of the river, and a contract which has been signed calls for the completion of the first of these within a year. Then, too, there are many plans on foot for placing subdivisions in this section on the market, and this means that a number of residences will be constructed.

The city has a large amount of work on hand which will call for rush contracts. The Brant street overhead bridge is to be erected this summer and a large amount of the preliminary work has already been done. The hydro-electric plant will be ready for operation early in July and plans are now being completed for the distribution system. The terminal station and sub-stations are almost ready, but the laying of the conduits on Main street and Portage avenue has not been started. This and the pole lines must be carried through under high pressure.

Work on an addition to the present police station will be started at once, where accommodation is to be provided for the new patrol system and additional quarters for patrolmen and general police detail work. Though the contract has not yet been called for, the city will install, during the summer, a complete patrol system connecting with the central and branch stations. It will mean a good contract for some electrical house as the entire installation will be new and it is proposed to make it absolutely up-to-date. Plans are now being perfected.

There is a lot of work in hand in connection with the bridges of the city. The superstructure of the Louise bridge is making but slow progress anad the city is taking steps to see that the contractors live up to their agreement. The government is at work on the lift span of their bridge at the foot of Lombard street for the Transcontinental Railway, and at the Assiniboine river the first two shore spans an the north end of the new double track railway bridge have been placed within the past week. There is a tremendous amount of steel work in connection with the viaduct at the Union terminals still to be done. One-half of the steel for the trainshed has been erected, but there are a half dozen subway viaducts still to be placed. A request has been made to the government for aid in building another bridge across the Assiniboine river at the city park, the government, city and municipality to share the expense. The indications are that this request will be granted. At Osborne street and at Main street the city proposes to construct new steel bridges, and though the plans have not been completed, the necessary money has been provided for.

There is no end to the proposals in regard to street railways and suburban lines. A cross-town line, parallel to Main street and four blocks to the westward has been insisted on by the city in order to relieve the existing congestion of traffic. It will be a little over a mile in length. Another east and west line parallel to Portage avenue, also to relieve congestion, and about the same length, has also been requested, and there are many extensions proposed to existing lines. This will keep the Winnipeg Electric Railway Company's construction department more than occupied.

The final plans for the entry of the Great Northern into the city are hanging fire, but it is expected that an agreement will be arrived at within a week or two. The demand is for elevated tracks, though there are but three streets to cross, and it is probable that a compromise will be effected, the company raising their tracks about eight feet and the city permitting a subway to be constructed. The Grand Trunk Pacific have considerable work to do at their new shops, east of the city, and alreay plans are being made for a number of residences, boarding houses and hotels to accommodate the workmen and staff.

Most notable among the rumors, and it is not contradicted at headquarters, is that the G. T. P. will proceed this summer with the construction of a 400-room hotel on a property which they have acquired half a block west of the Union Depot. The plans, as already prepared, call for a structure which will cost over a million dollars, and there have been several events during the past week which add weight to the rumor.

The city has accepted the plans of George G. Teeter for a new tubercular hospital which will be built this summer. Tenders will be called for within a short time, and a site has been selected. The building, which will cost about $75,000, will be erected in Riverview, on the bank of the Red river.

So far there has been no suggestion of trouble in regard to the labor market, and it is hoped that none will arise. Existing agreements have seemed to give satisfaction and it is expected that those which expire this spring will be renewed.

L. H. S.

From the Federal Capital

Ottawa, March 16, 1911.

Due to the epidemic of typhoid fever, almost the entire interest in the city is on the question of how the water supply can be improved. There has been a great deal of discussion regarding the suggestion of Mr. N. Cauchon and Dr. Bryce to build a sedimentation basin in the Ottawa river west of the city. The need is for something that will help at once. There is so little water over the city intake pipe at present that it has not sufficient head to carry enough water to the pumps when they are running at high speed in case of fire. It has been customary under such conditions to open valves in the intake nearer the shore and let enough water in there to provide against a vacuum being formed in the intake by the fast pumping and the water from the mouth of the pipe not coming in volume enough to supply the pumps. Such a vacuum would cause injury to the pipe. However, it is by letting in water near the shore that has, to a great extent, been responsible for the typhoid. So at present in case of fire if the valves are opened, typhoid water is let in and if they are not the pipe is liable to be torn up. R. L. Haycock comes forward with a proposal for immediate relief. He suggests placing centrifugal pumps at the mouth of the intake pipe which would pump water into the intake and keep a constant pressure to supply the big pumps at whatever rate they might run. This suggestion is being considered by the city engineer. He suggests two pumps of 100 h.p. each.

Prices in the building supplies remain very much the same, according to the city contracts. Stone is slightly lower. Brick dropped from $8.30 per M. to $8.20. In other cases there is not much difference except in the price of sand, which has advanced 7 cents a cubic yard, from 87 to 94 cents. The supply of sand immediate to the city is not as plentiful as could be wished. Then there is a move on foot on the part of the sand interests to amalgamate, and one large company is being formed which claims that it has now control of every sand pit of importance close to the city as well as the equipment used for securing river sand. The promoters of this company state that prices will therefore advance this summer anywhere from 10 to 20 cents a cubic yard.

Probably this will be the biggest advance that will take place in building materials this year. Lumber prices are very nearly the same. The brick manufacturers state that in spite of the fact that the city contract for this material was low, prices will be a little stiffer this year than last. There is already a big demand for brick and the companies are receiving a great many orders for early spring, with little or no supply to meet the earliest buildin. The Silicate Brick Works are beginning operations.

The demand for brick will doubtless be very great all the summer. A large number of apartment houses are being planned as well as many smaller commercial buildings. It is thus very probable that the scarcity which prevailed last year will be duplicated this season.

Some idea of the huge sum annually called for in the improvement appropriations of a large transcontinental railway like the Canadian Pacific can be had from the statement that improvements now under construction at the two cities of Calgary and Toronto alone will involve an expenditure of something like $17,000,000. Of course this sum does not apply only to the cities themselves, but to general improvements in their vicinity. At Calgary a million dollars will be devoted to the building of a huge hotel; the railway station, new only two years ago, is to be greatly enlarged, and additional office space provided. At Toronto new stations, new freight sheds and a huge sixteen storey building are to be erected. These improvements will make a big hole in the $17,000,000, and there are numerous smaller items which will take care of the balance of the appropriations for these districts.

Mr. F. P. Jones, general manager of the Canada Cement Company, Limited, recently gave a banquet to the firm's sales staff at the St. Regis Hotel, Montreal. The men came in to headquarters from all parts of the country to meet the heads of the firm and benefit by personal intercourse with them. The general manager presided at the banquet and a very enjoyable evening was spent. Business was reported to be flourishing in all parts of the field.

Mr. J. W. Seens, formerly of the Canadian Bridge Company, Limited, Walkerville, Ont., has been appointed manager of the Structural Steel Company, Limited, of Montreal, to succeed Mr. J. L. Brower, who resigned to become general manager of the National Bridge Company of Canada, Limited.

The appointment of D. O. Lewis as superintendent of construction of the Vancouver Island section of the Canadian Northern Railway is announced. He was recently engaged by Mackenzie & Mann as engineer of the Portland Canal short line.

Vancouver's New City Engineer

Mr. F. L. Fellowes, who has just accepted the appointment as chief, or supervising, engineer for the city of Vancouver, B.C., was born in Ottawa, Ont., about forty-eight years ago. He started to learn his profession before the days of technical colleges and was articled to a firm of civil engineers and land surveyors. Among the first important works of which he was given charge was bridge foundation work under Mr. C. H. Keefer, of Ottawa. Next he was assistant engineer at West Toronto Junction, where he had charge of sewer and subway construction, macadam road building and over-head bridge work. Later he was employed on the short line (now C. P. R.) railway connecting New Brunswick and Quebec. He was for some time assistant engineer of the Central Ontario Railway and was employed on hydraulic power construction work on the Trent Canal, near Trenton. He went to the Northwest on land surveying work before the Riel rebellion. Returning he took up the practice of his profession in a private way at Toronto and supervised the construction of the Keele street subway, which involved an outlay of some $200,000.

Thirteen years ago Mr. Fellowes went to Montreal, and after three years' private practice was appointed engineer for the then town of Westmount, which position he has filled with eminent satisfaction ever since. During this period he has been connected with many important local projects. He worked for a year in conjunction with Mr. F. H. Pitcher, engineer of the Montreal Water & Power Company, and Mr. J. C. Macklin, hydraulic engineer, securing data and preparing a report on the best location for the intake of the M. W. & P. Company. Also, he conducted surveys on the river St. Lawrence to determine the velocity and direction of currents and points of shore sewage contamination, with a view to the establishment of a waterworks system for the city of Westmount. Later, he was associated with Mr. Geo. Janin, chief engineer of Montreal, and Mr Willis Chipman, of Toronto, representing the Federal Government, as a commission to report on the best system of drainage for the west end of the city of Montreal and adjoining municipalities, including the question of the relation of the Little River St. Pierre to the entire new drainage system. He investigated the various systems of lighting, filtration and incineration in vogue in leading cities in Canada and the United States, and on his report the plants now in

Mr. F. L. Fellowes, City Engineer of Westmount, who is shortly going to Vancouver [illegible] in Westmount were established. His latest important work was the preparation of a report for the town of St. Lambert as a basis for waterworks drainage and street improvement operations to the value of $225,000, on which a favorable vote was given at the municipal elections held recently. In addition to his duties as engineer for Westmount Mr. Fellowes was responsible for purchasing all supplies for the municipal plant, including horses and fodder. He also directed the scavenging department. He has prepared plans and estimates for $45,000 worth of new paving to be commenced with the opening of the spring.

It is not to be wondered at that a man of such wide and varied experience—and such a capacity for work—should have been offered $8,000 a year and given a free hand to manage the public works department of the city of Vancouver.

Mr. Fellowes' Successor at Westmount

Mr. Archibald Currie has been appointed city surveyor or chief engineer for the city of Westmount in place of Mr. F. L. Fellowes, who resigned recently to accept the superintendency of public wohks at Vancouver. Mr. Currie has had wide experience in large municipal engineering works, including waterworks and street railway construction in Great Britain and elsewhere.

Mr. Archibald Currie, who has been appointed City Engineer of Westmount, Que., to succeed Mr. Fellowes

Born in Glasgow, 42 years ago, and educated in that city and at the West of Scotland Technical College, Mr. Currie graduated as an engineer in 1890. For three years he was assistant engineer with the celebrated firm of Sir John Aird & Sons, contractors, in London. He then accepted an engagement with the Chinese government as resident engineer in charge of important engineering works in the north of China.

When Admiral Sir Edward Seymour made his famous attempt to relieve the European legations in Pekin in 1900, at the time of the Boxer uprising, Mr. Currie was his chief engineer. For his services in this connection Mr. Currie received a medal and clasps. A very interesting and touching incident in Mr. Currie's experience at that time was the fact that his wife and family were in Tien Tsin and he, of course, was unable to assist them in their peril or learn how they fared.

South Africa was the next continent visited by Mr. Currie. The city of Johannesburg benefited by his services for six out of the nine years that he spent in Africa, during which time he was in charge of electric railway, drainage and road construction work.

On returning to Great Britain Mr. Currie became engaged as consulting engineer on water supply works and similar enterprises in Ireland, Scotland and Wales. His coming to Canada having been coincident with Mr. Fellowes' resignation, Mr. Currie's services were at once available and his engagement by the municipality begins at once.

New Montreal Schools

Mr. A. W. Dunlop, architect, Montreal, reports three new schools completed and another to be ready by April 1st. These buildings are for the Protestant School Commissioners. The plans were selected after keen competition. In the case of the Dawson school, which is being built on Christopher Columbus street, at a cost of $200,000, there were seventeen competitors. The Alexandra school on Sanguinet street, has been completed at a cost of $150,000, and the Royal Arthur school, on Canning street, at a cost of $100,000. Two large wings have been added to the Earl Grey school. The walls of the three first named buildings are built of Montreal limestone to the full height of the basement and in some cases to the top of the first storey; the remaining storeys are of brick with Roman stone trimmings. The contractors were as follows: for the Wm. Dawson school, Gray & Wighton; Alexandra school, Byers & Anglin; Royal Arthur school, C. E. Deakin; Earl Grey school, E. G. M. Cape.

Mr. Dunlop was also the architect for a five-roomed school at Rosemount, for which Mr. L. Beaudry is the contractor.

Contractors Successful in Action against G.T.P.

Judgment in favor of plaintiffs has been given in the action Wickam vs. the G. T. P., the case having recently been concluded at Edmonton after dragging along for nearly two years. It was based on an understanding the plaintiffs, formerly a contracting firm in Edmonton, had with Frank Morse, former general manager of the G. T. P. that they were to secure a contract for 100 miles of the railway west of Edmonton. Mr. Morse sent a telegram to Messrs. Alfred and Wickam giving them to understand that they were to put in supplies, which would be taken over at cost by the railway company, in case the contracts were not warded to them. The plaintiffs installed $163,000 worth of supplies at Wolf Creek. When Mr. Chamberlain succeeded Mr. Morse, the supplies were taken over and only $100,000 paid. Mr. Chamberlain claiming that the contractors, by not having their plant on the ground ready to commence work, had refused to accept the contract.

Messrs. Ross & Holgate, hydraulic and electrical engineers, Montreal, have tested the new plant of the Sherbrooke Railway and Power Company and found it ready for operating. This is a 3,000 h.p. plant, costing about $150,000. It is on the Magog river and the company will have power to sell as well as to operate their street car service. Messrs. Ross & Holgate were the supervising engineers. The concrete and other building work was done by the Bishop Construction Company, Limited, of Montreal. The Canadian General Electric Company, of Toronto, furnished the electric apparatus, and the Jenckes Machine Company the hydraulic machinery. Work on the plant was commenced last July.

The union carpenters of Victoria, B.C., are asking for $4.50 a day from the 1st of May.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.

Tenders are to be in the hands of the city in about a week's time for a 5-ton roller, a portable asphalt paving plant (capacity of 800 to 1,000 square yards per day), and a stone breaker. These items are included in the $25,000 by-law carried. The by-laws for paving and sewers were carried.

Edmonton, Alta.

Tenders addressed to city commissioners, will be received until April 8th for supply of water meters required by the city during the year 1911. Specifications obtained at the waterworks department.

Fort William, Ont.

Tenders addressed to the chairman of the utilities committee will be received until April 5th for labor and material in connection with the laying of 18-in., 14-in., 12-in. and 8-in. water mains, and making necessary connections, valves, etc., will be supplied by the corporation. John Wilson, city engineer.

Hull, Que.

Tenders addressed to J. F. Boult, city clerk, will be recevied until April 10th for construction of artificial stone sidewalks, sewer pipe, etc., as the case may be. Specifications, etc., at office of city engineer Chene, C.E.

Ingersoll, Ont.

Tenders for construction of sage drain, Tp. of West Oxford, etc., will be received until April 1st by B. Jenvey, Tp. Clerk, West Oxford.

Lachine, Que.

Tenders addressed to L. K. Jones, secretary, department of railways and canals, will be received until March 28th for concrete walls and building of roads, etc., at office of the superintending engineer of the Quebec canals, No. 2 Place d'Armes, Montreal.

Leamington, Ont.

Tenders addressed to Alex Baird, C.E., commissioner in charge, Leamington, will be received until April 8th for construction of the Seventh Concession Outlet Drain, etc., in Tp. of Malden. Plans, etc., at office of [illegible] Tp. Clerk.

Moncton, N.B.

The waterworks system to be established here is estimated to cost about $250,000. J. Edington, city engineer: E. A. Reilly, mayor.

North Vancouver, B.C.

Tenders for laying [illegible] Mahon, Chesterfield, St. George's, St. Andrew's and St. Patrick's avenues, from the waterfront to Third street, were received from: M. P. Cotton & Co., $36,972; Palmer Bros., $40,080.83; Mathew and James McDonell, [illegible] mino Pinto, $35,958.25; L. P. Laplacca, $43,451.62; McAlpine-Robertson Construction Company, $41,200; R. McLean & Co., $28,620; and W. Allan Kennedy, $40,449. Referred to the engineer.

New Westminster, B.C.

Burnaby ratepayers will shortly vote on money by-laws to authorize the raising of half a million dollars for opening new roads.

North Toronto, Ont.

The ratepayers voted in favor of the issuing of $265,000 debentures for construction of sewerage system.

Port Arthur, Ont.

Work on the lengthening of the 1,000 feet of additional intake pipe here will start shortly. Material is on hand.

Tenders addressed to J. McTeigue, city clerk, will be received until March 25th for supply and delivery, f.o.b. city warehouse, of sewer pipe.

Sarnia, Ont.

Tenders are called until March 25th for constructing cement walks, concrete curb; also for sewer supplies, etc. Specifications at office of town engineer, H. A. McLean.

Saskatoon, Sask.

Tenders addressed to the City Commissioners will be received until April 7th for cement sidewalks. Plans at office of the city engineer, Saskatoon. Jas. Clinkskill, mayor.

Tenders addressed to Jas. Clinkskill and W. B. Neil, city commissioners, will be received until March 24th for the following: tile pipe and specials, galvanized iron pipe, lead pipe, brass fittings, service boxes, water meters, tapping machines.

Simcoe, Ont.

Tenders addressed to E. Boughner, county clerk, will be received until April 4th for construction of septic tank at the Norfolk Industrial Farm and Home. Plans, etc., at office of the above.

Toronto, Ont.

Tenders addressed to the Chairman, Board of Control, will be received until March 28th for construction of sewers on seven streets.

Tenders addressed to the chairman of the board of control will be received unof water pipes, valves, hydrants and of water pipes, valves, hydrants and special castings. Advertisement in "Tenders and For Sale Department," of this issue.

Victoria, B.C.

The following firms tendered on the asphalt paving required for View and Fort streets, the government having decided favorably in respect to these two [illegible] Company, on standard pavement, $1.90 per square yard; with excavation and curb and gutter extra; Pacific Westrumite Asphalt Company, standard not quoted, alternative bids from $2.21 to [illegible].50 per square yard, excavation and curb and gutters extra; city engineer, standard, $2.15 per square yard, excavation and curb and gutters extra; Worswick Paving Company, no bid on standard pavement, alternative bids from $1.60 to $1.75 per square yard, excavation and curb and gutters extra; Eloso Paving Company, alternative bids of $1.85 to $2.10 per yard; Moore & Pithick, standard pavement, $2.60 to $3.10 per square yard, excavation and curb and gutters extra. The city engineer favored returning the tenders to the various bidders and then calling for bids for a very large amount of work.

Welland, Ont.

Tenders are called until April 3rd for construction, etc., of one unit water-driven waterworks pumps, etc. Advertisement in "Tenders and For Sale Department," of this issue.

Westmount, Que.

Tenders addressed to A. D. Shibley, city clerk, will be received until March 30th for supply of cement, sand, crushed stone, lumber, paving blocks, sewer pipe, bricks, and farm tile, required by the road department for 1911. Information obtained from city surveyor.

Winnipeg, Man.

Tenders addressed to the chairman, board of control, will be received until April 19th for supply of labor and materials required in construction of wooden stave conduit for extension of water pipe line, etc. Plans, etc., with city engineer; M. Peterson, secretary.

AWARDED

Hamilton, Ont.

The council gave to Sackville Hill the contract for the year's supply of sewer pipe, also to Chadwick Bros., of Hamilton, for furnishing compression stop and corporation cocks, and 50 hydrant drop valves.

Kerrisdale, B.C.

The contracts for the laying of the pipes for the waterworks system in Point Grey are as follows. Contracts No. 6 and 7 have been awarded to Mr. McAdam and contract No. 8 to Kilber & Moore. It is the intention to construct a reservoir at D. L. 540, to supply that portion of the municipality, in addition to the main reservoir on Whitehead road, and contract [illegible] a 25-inch main from the reservoir on Whitehead road to the proposed reservoir in 540. Contract No. 7 is for laying distribution mains through Kerrisdale, Magee and the surrounding section of the municipality. Contract No. 8 is for the laying of the distributing mains in Eburne and district Total amount, about $145,000.

St. Boniface, Man.

The city council awarded the contract [illegible]

Vancouver, B.C.
The grading of Vancouver street between Dunlevy avenue and Humboldt street will be done by the Westrumite Paving Company, the British Columbia representative of which is Mr. J. Nixon.

Railroads, Bridges and Wharves

Brockville, Ont.
Tenders are called by the county road commissioners until April 17th for construction of concrete floor on the South Lake bridge across the Gananoque river, Tp. of Leeds. Plans, etc., at office of E. R. Blackwell, county engineer,

Calgary, Alta.
The Grand Trunk Pacific is after more property along the Bow river front, east of the Langevin bridge. W. A. Lowry is interested.

Centreville, N.S.
Tenders are asked until March 27th by the Hon. Chief Commissioner of Public Works for rebuilding the Centreville bridge in Studholme, Kings Co.

Edmonton, Alta.
The C. N. R., it is said, will build 40 miles on their line running northwest from Onoway toward Dunvegan on the Peace river. Contract will probably be let this spring.

Fredericton, N.B.
It is reported that a second railway may be built between Levis and Moncton. Mr. Thos. Malcolm has, it is understood, acquired the charter for the Quebec and New Brunswick Railway, and contemplates building from Levis to St. Leonard's, a distance of 174 miles. From St. Leonard's the road will run to Grand Falls, a distance of twelve miles, and thence to Woodstock, 74 miles. From Woodstock it is 62 miles to Fredericton, and another twenty miles will take the road into St. John. It is rumored that the road would be constructed in the interests of the Canadian Notrhern. D. B. Hanna, vice-president C. N. R.

Golden, B.C.
See "Business Buildings."

Kingston, Ont.
On April 4 a by-law will be submitted to the ratepayers to raise $30,000 for the purchase of the Cataraqui bridge and the construction of a span in the centre. Noted in issue of February 22nd.

Kenora, Ont.
Tenders are called until March 27th for construction of sub-structures for bridges and culverts on the Manitoba division and for subway at Main street here. Frank Lee, division engineer, Winnipeg.

London, Ont.
Charles Talbot, county engineer, has prepared plans for a number of bridges to be erected in the county of Middlesex this year. Tenders for ten will be called for on April 1st. These range in size from ten-foot culverts to 45 ft. spans, and will cost about $8,000. All the small structures will be of reinforced concrete; the larger spans will be of steel and concrete.

Montreal, Que.
Tenders addressed to David Seath, secretary, harbor commissioners, will be received until March 29th for construction of ferry wharf and approaches. Plans, etc., upon application to F. W. Cowie, chief engineer.

Ottawa, Ont.
The city engineer has been instructed to prepare plans for an iron bridge across the G. T. R. tracks at Bronson avenue instead of a wooden bridge, as authorized by the Railway Commission.

The C. P. R. has completed plans and will shortly award the contract for a $70,000 roundhouse in the Union Station yards here. The structure will be concrete. Big alterations in the yard trackage are also being planned.

Hon. C. R. Devlin will recommend that a bridge be built across the Lievre at Notre Dame du Laus and to continue to Gracefield by means of a new road. A splendid road will also be opened up between Maniwaki and Rapide de L'Orignal. In addition, several buildings will be built.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until April 3rd for construction of Plaza between Dufferin and Sapper's bridges, alterations to Dufferin bridge and demolition and reconstruction of Sapper's bridge. Plans, etc., at office of the above department.

Port Burwell, Ont.
The C. P. R. propose spending about $30,000 on improvements here, providing the town agrees to certain tarnsfers of property.

Richibucto, N.B.
Tenders are called until March 28th for construction of approach to public wharf here by Public Works Department, R. C. Desrochers, secretary.

Vancouver, B.C.
The Howe Sound & Northern Railway Company will shortly call for tenders for the construction of an additional ten mile extension to the main line. Work will be rushed this spring and summer.

The city engineer has been instructed to prepare a general plan for overhead bridges over the Great Northern Industrial tracks east of Campbell avenue, on Hastings, Pender, Keefer and Harris streets.

Weyburn, Sask.
The contracts for the line from Estevan to Forward, 36 miles; one from Weyburn west 20 miles, and one from Carmangay to Aldesyde, 27 miles, on the C. P. R. are still to be awarded in the west.

Winnipeg, Man.
The plans for the proposed entrance of the Midland Railway into Winnipeg were presented at the board of control meeting by Mr. Gilman, the chief executive. The plans will be discussed before the railways committee. James Fisher, Winnipeg, representative of J. J. Hill.

Surveys have been made for the railway line from Winnipeg to Fort Alexander by the C. N. R. corps. Original charter for line is under the name of the Winnipeg Northern Railway. It is not known whether the road will be electric or steam. The charter gives power for both. Mr. McLeod, manager, C. N. R.

AWARDED

Estevan, Sask.
A contract for the grading of 55 miles of railway west of Estevan has been let by the C. P. R. to J. D. McArthur.

Fernie, B.C.
The C. P. R. has awarded a contract to Digby & Grenier, contractors, this place, for the construction of a large bridge were as follows: O'Neill & Loney, south fork, near Fernie. The bridge will be 860 feet in length and 137 feet high, and will require 1,500,000 feet of timber, 1,000 yards of concrete, 500 piles and 2,000 yards of excavation. It is stated that its construction will occupy the greater part of six months.

Ottawa, Ont.
The road and bridge committee of the county of Carleton awarded the tenders for the construction of three concrete bridges in the county as follows: Jennings and Ross, Traders Bank, Toronto, for the three bridges. Theirs was the lowest tender and was $2,795 for the bridge on the second concession of of Osgoode. The 4th line bridge, near Carp, will be repaired. Chas. McNab, county clerk; R. W. Farley, 158 Nelson street, Ottawa, engineer.

St. George's East.
The tenders for concrete and iron bridge were as follows: O'Neil c Loney, Quebec, $16,172; Joseph Gosselin, Levis, $14,300.

Whitefish, Ont.
We are advised that the Superior Construction Co. (T. J. Kennedy, president), Sault Ste. Marie, have been awarded the contract for construction of roadbed and structures for the M. & N. S. Ry. from Crean Hill to Whitefish. Contract price, $1,500,000, let on percentage basis. R. S. McCormick, engineer in charge, Sault Ste. Marie.

Public Buildings, Churches Schools, etc.

Amherst, Ont.
Competitive plans are called until March 31st for 12-room school of brick with stone or cement trimmings.

Aylmer, Ont.
The ratepayers passed a by-law authorizing the expenditure of $4,000 on remodeling the town hall. Work will be commenced at once.

Bannatyne, Man.
Tenders addressed to J. N. Semmens, architect, 903 McArthur Building, Winnipeg, will be received until March 30th for erection of Public school here. Plans, at office of Secretary, D. Macdonald, care Lewis Furniture Co., or with above. Also for sinking of well for school at St. James.

Belleville, Ont.
Tenders addressed to city clerk, will be received until March 30th for erection of new reinforced concrete floor at No. 2 Fire Hall; also for painting and glazing of the new police station. Jas. G. Lindsay, city engineer.

Berlin, Ont.
The sketch of Mr. W. H. Breithaupt for the building for athletic grounds was approved. He was authorized to prepare plans, etc., and call for tenders.

Brandon, Man.
It is probable that a Carnegie library will be established here. John McDonald is interested.

Brockville, Ont.
Tenders addressed to A. Stuart Allaster, architect, will be received until

March 25th for alterations and addition to First church. Plans, etc., at office of the above.

Calgary, Alta.

The by-law to establish incinerator was carried; also that for fire hall.

Tenders addressed to J. Diamond, president, 232 Eighth avenue east, will be received until March 28th for erection of Hebrew Synagogue on First avenue east. Plans, etc., with above.

Tenders were called until March 21st for erection of Wesley Methodist church. Plans, etc., at office of J. E. Bull, Norman Block. T. Vandelinder, Room 9, Alexander Corner, recording steward.

Charlottetown, P.E.I.

The congregation of Zion Church will erect a new church this season. A committee composed of M. McLeod, W. T. Huggan, Rev. R. G. Strathie, pastor, and others, were appointed to decide on plans, to call for tenders, etc.

Chatham, Ont.

Messrs. Zakoor plan extensive improvements to the present Princess theatre.

Collingwood, Ont.

Tenders addressed to John Wilson, architect, will be received until April 4th for erection of 8-room school for the Board of Education. Plans, etc., at office of the above.

Chapleau, Ont.

A new municipal building containing free library, town council chamber, clerk's offices, complete theatre, large assembly and banquet hall will be erected. Tenders are being called for construction by H. W. Angus, architect, North Bay.

Eburne, B.C.

Tenders addressed to J. W. Fairhall, secretary, Point Grey, S. B., will be received until March 29th for erection of 2-storey addition to the Kerrisdale school house. H. Bowman, architect, 112 Crown Building, Pender street, Vancouver.

Additions will be made to three schools in Kerrisdale. Tenders close 29th inst. Architect, Mr. Bowman. The trustees are negotiating for the purchase of four school sites.

Edmonton, Alta.

Tenders addressed to John Stocks, Deputy Minister of Public Works, will be received until March 25th for plastering material and brick required in connection with the new parliament buildings here. Specifications at office of engineer, department of public works.

Fairville, N.B.

Tenders are called by Public Works Department, Ottawa, until April 10th for erection of public building here. Plans, etc., on application to D. H. Waterbury, superintendent of public buildings, St. John, at above department and at local post office.

Florence, Ont.

Messrs. Wilson & Son, architects, Chatham, are preparing plans for a new Methodist church here. Tenders will be called in a few day

Fort William, Ont.

The council are in favor of submitting a by-law to raise the $100,000 for school purposes.

Galt, Ont.

The Business Men's Club have decided to erect a club house, 2-storey and basement, 50 x 60 ft., on Dickson street. President Geo. A. Dobbie; secretary-treasurer, M. A. Secord, K.C.

Gravelburg, Sask.

Tenders are called until March 25th for construction of Dominion Government Immigration Hall here. Plans, etc., at office of Geo. Ruffell, Immigration Agent, Moose Jaw; S. J. Bruce Walker, Commissioner of Immigration, Winnipeg.

Grand Forks, B.C.

The provincial public works department is again inviting tenders for the erection of a new court house, tenders to be received until April 3 next. The plans have been completed by Mr. Lawrence, supervising architect, for the provincial government. They indicate complete abandonment of the plans previously prepared, and show a handsome structure in the Italian Rennaissance, to be built of British Columbia white marble and buff brick, occupying a ground floor space of 72 by 74 feet.

Hull, Que.

The Sisters of Providence have offered to erect a hospital on modern plans at a cost of $34,000 in return for site, etc. Work will commence next spring. Mayor Archambault.

Ingersoll, Ont.

Tenders are called until March 30th for erection of public school in S. S. No. 2, Tp. of West Oxford. Messrs. Taylor & Taylor, architects, Hope Chambers, Brantford.

Ilderton, Ont.

Tenders addressed to A. L. Hodgin, secretary, will be received until March 25th for erection of Methodist church here.

Lethbridge, Alta.

Lethbridge will shortly submit two by-laws, $100,000 for building and improvements on the Agricultural Society grounds, and $58,600 for improvements to Henderson Park.

Levis, Que.

Tenders addressed to R. C. Desrochers, secretary, will be received until April 5th for erection of Armoury here. Plans, etc., on application to A. R. Decary, district engineer, Quebec.

London, Ont.

The Masons, it is stated, will commence the erection of their new Masonic Temple next month. G. W. McGuire, president.

Montreal, Que.

Mr. Dalbe Viau, architect, is about to call for tenders for two new schools for the Catholic School Commissioners, and for the construction of a row of seventeen tenements on Mentana street, and eight tenements on Stadacona street.

Mr. H. L. Pacaud has taken out a permit for the rebuilding of King's Hall, recently destroyed by fire. The cost of the repairs will be about $60,000

At a meeting of the Montreal Amateur Athletic Association the following were appointed on the committee to look after the erection of the proposed new club house: E. Herbert Brown, Gordon C. Bowie, Percival Molson, J. H. Boyd, and others. Estimated expenditure [illegible] $80,000; architects, Messrs. Ross & McFarlane.

The Winter Club, Limited, have under consideration the erection of a club house. Messrs. E. & J. Maxwell are the architects; Capt. D. C. Newton, hon. secretary. Sir H. Montague Allan, H. S. Holt, H. Joseph, and Hugh Paton are on the building committee.

The Protestant Board of School Commissioners have decided to make an extensive addition to the Fairmount school in Laurier Ward. A new wing on the south side will be four storeys high, the same as the main building. The alterations will be made during the holidays. The construction will be of pressed and rustic brick corresponding with the present building. The windows will be enlarged and made uniform in style. The old heating plant will be replaced by new apparatus, and the ventilation also, the designing of the latter being in the hands of the Domestic Engineering Company. The furnaces and boilers will be in a fireproof apartment. The architects are Messrs. Nobbs & Hyde, and the general contractor is Mr. E. G. M. Cape. The estimated cost is $150,000.

Nanaimo, B.C.

The Nanaimo Agricultural and Horticultural Society will call at once for tenders for construction of exhibition buildings to cost about $10,000.

Ottawa, Ont.

The Salvation Army have commenced a campaign to raise $20,000 for the erection of a new citadel. Staff Captain Burrows, Toronto, is in charge.

Outremont, Que.

The council is again considering the advisability of erecting a new town hall on a more central site than the present one.

Portage la Prairie, Man.

It is rumored here that the government intend to spend about $100,000 in the erection of buildings. The largest expenditure in view is that at the Industrial school, where the intention is to erect a separate building for the girls confined there.

Port Arthur, One.

Tenders addressed to J. McTeigue, city clerk, will be received until March 22nd for construction of proposed extension to municipal building on Arthur street. Plans, etc., at office of M. B. Aylesworth, Court street.

Preston, Ont.

Tenders are called until April 10th for erection of Roman Catholic church here. Plans, etc., at residence of Father Gehl

Regina, Sask.

The plans of the Regina College were approved by the Board of Governors. Dr. W. W. Andrews, president. Tenders will be called shortly.

Tenders are called until March 24th for erection of new church for First [illegible] secretary building committee

St. Theresa, Que.

Tenders addressed to [illegible] Mc-Donald, P.P., will be received until March 25th for erection of new Roman [illegible]

Saskatoon, Sask.

[illegible] a by-law authorizing the expenditure of $150,000 for city hall will go to the people.

The council [illegible] the clerk to advertise for competitive plans for a city hall to cost $150,000

St. John, N.B.

The question of the establishment of [illegible] is under consideration.

Sunderland, Ont.

Tenders were called until March 20th for erection of [illegible] school here. Plans, etc., on application to N. McPhaden or to J. H. Robertson, architect, Orillia, Ont.

Toronto, Ont.

Tenders addressed to Darling & Pearson, architects, 2 Leader Lane, will be received until April 1st for the various trades required in erection of club house for the Toronto Hunt, Limited. Plans, etc., at office of above.

The city will be permitted to build new registry office without submitting the matter to the ratepayers.

The school board has approved of the plans prepared by Superintendent Bishop for the 17-room school on Caledonia road, and tenders were ordered to be called.

Vancouver, B.C.

Tenders are called for erection of a stock judging pavilion, Hastings Park, for Vancouver Exhibition Association. Plans, etc., at office of the architect, C. P. Jones, A.R.A.I.C., 429 Pender street west.

Tenders for the purchase of the court house property, corner of Hastings and Cambie streets, are being asked by the provincial government until April 22nd.

Tenders were called until March 22nd for construction of grand stand in Stanley Park. O. W. Moberg, 314 Cotton Building.

A Western Canada Ice Hockey League, embracing Vancouver, Victoria, etc., has been formed, which has a proposition to construct artificial rinks in these two cities for which sites have already been secured. Contracts will be let within sixty days, it is stated. Directors or Vancouver Co., Messrs. F. L. Buckley, Blake, Wilson and Joseph Patrick, Nelson.

Victoria, B.C.

The inadequacy of the post office for present needs and the necessity for a new court house and a more spacious registry office was discussed at a recent meeting of the Board of Trade. C. H. Lugrin and Mr. Leiser spoke to the question. Deputy-postmaster-general, Dr. R. M. Coulter.

Walsh, Ont.

Tenders were called until March 20th for erection of brick veneered 1-storey school for S. S. No. 14, Charlotteville. A. Neilson, trustee.

Welland, Ont.

The Presbyterian Church Sunday school will be enlarged.

Whitby, Ont.

The Board of Education have decided to proceed with the erection of a new collegiate institute at once.

Winnipeg, Man.

The city of Winnipeg will shortly call for the erection of a new tubercular hospital at a cost of $75,000. M. Peterson, secretary, Board of Control.

Plans for a combined automobile and motor club house at Winnipeg beach are now under consideration and will likely be settled at an early date. When the final decision is reached the building will be commenced at once, and it is expected that it will be ready for occupation during the present year. Accommodation of the highest possible class will be provided for both the motor boat owners and the motorists, including garages for the automobiles and a harbor and land-

AWARDED

Brandon, Man.

The Brandon Construction Company was awarded the contract for the East Ward school at a price of $42,256. The building will be eight-roomed, of reinforced concrete, pressed brick and cut stone, with all floors and stair cases fireproof. The contract calls for completion by September 1 next.

Edmonton, Alta.

Mr. M. L. Bertheaume, proprietor Senate Hotel, will erect an addition to cost about $40,000.

Galt, Ont.

The following contracts for Trinity Church Sunday school have been awarded: Excavation, masonry and concrete work, Thomas and Hancock; carpenter work, Wm. Holman; painting, J. W. Swain; plumbing and electric wiring, Lockhart and Co.; slating and galvanized iron, the Brown-Jarvis Roofing Co., Brantford; plastering, Wm. Mogg. Hamilton.

Hamilton, Ont.

Contracts for erecting the county house of refuge are reported awarded as follows (total cost about $40,000): Masonry, Hancock Bros.; carpenter work, Bowman & Gray; galvanized iron and slating work, John E. Riddell; painting and glazing, Matthews & Williams; electrical work, Lowe & Farrell; plumbing and heating, Rodgers, Gibson Co.; mantel and tile, Kent, Garvin Co.; all of

Kingston, Ont.

The contract for masonry and carpentry in the Nicol Metallurgy building has been given to Michael Sullivan, of this city, $45,000. Total cost of building, $55,000; Powers & Son, architects.

St. Isodore d'Auckland, Que.

The contract for school here was awarded to M. Joseph Perron, St. Isodore, $1,650.

Stratford, Ont.

The contract for the erection of the new children's shelter on Clark street has been let to Messrs. Cowan and Walker. They will sub-let the work to the various contractors.

Sherbrooke, Que.

The contract for the construction of annex to the St. Charles Borromee Seminary has been awarded to Messrs. Lefebvre & Bonin, contractors, Sherbrooke. Architect, J. W. Gregoire. Reported cost, $71,000.

Toronto, Ont.

A. B. Ormsby, Limited, have been awarded the contract for roofing, skylight and copper flashing work on the Museum building, Queen's Park; contract for the galvanized iron work, windows and steel rolling doors on Telegram building.

Vancouver, B.C.

The contract for the new Labor Temple has been awarded to Norton Griffiths Steel Construction Company, Ltd., $136,000; Thos. Hooper, architect.

Victoria, B.C.

The South Saanich municipal council has awarded the contract for the construction of the new municipal building to be erected on a site near Royal Oak to C. H. Merkely. J. C. M. Keith, architect.

Winnipeg, Man.

S. B. Ritchie has secured the contract for the new pavilion to be erected in Assiniboine Park by the city of Winnipeg.

Residences

Brantford, Ont.

Tenders addressed to Dr. B. W. Kinscott, will be received until March 25th for erection of residence. Geo. W. Hall, architect.

Calgary, Alta.

William Laing, architect, 229a Eighth avenue east, called for tenders for excavation and concrete works of F. M. Blackhouse, Mount Royal.

Harwich, Ont.

The parsonage of St. Paul's Church, near Chatham, was destroyed by fire on the 17th inst. Estimated loss, $5,000.

Galt, Ont.

Tenders are called until March 24th for erection of brick veneer house for H. Willard. Plans, etc., with J. Evans, architect, Ball avenue.

Montreal, Que.

Mr. Henry Gaffney, of Montreal and Toronto, is building a block of forty houses on Oxford avenue, Notre Dame de Grace Ward. They will be semi-detached, self-contained, solid brick residences. The entire block is valued at $170,000.

Moose Jaw, Sask.

Plans are being prepared for a large apartment block on Fairford street east, property purchased last week. The deal was put through by Davis & McIntyre.

Tenders are called until April 1st for erection of resiednce, etc., for J. McCauley. Plans, etc., at office of R. G. Bunyard, architect, Moose Jaw.

Prince Albert, Sask.

Andrew Lunn, of Asquith, Sask., has purchased six lots. He will erect a residence.

Toronto, Ont.

H. C. Schofield has been given a permit for a $26,000 residence, Highland avenue.

Vancouver, B.C.

The Provincial Land & Financial Corporation have filed an application for permits for eight residences, cost $22,700.

Victoria, B.C.

Dinsdale & Malcolm, contractors, will erect their 3-storey brick and stone apartment house on Field street. Plans have been approved. Estimated cost, $25,000.

Welland, Ont.

W. G. Rennie, J. R. Jackson and J. Wing, of Toronto, are arranging to build forty houses for rental in the new sub-division purchased here and placed in lots a short time ago. The houses will cost about two thousand dollars each. Two brick blocks with two stories each are to be built on Division street in the near future.

AWARDED

Brandon, Man.
A. McDonald, Brandon, has been awarded the general contract for erection of St. Paul's Presbyterian Church manse, $10,500; Brandon Heating and Plumbing Co. that for heating, etc. Shillinglaw & Marshall, architects.

Montreal, Que.
Messrs. Geo. W. Reed Co., Limited, have been awarded the contract for the copper roofing of Lieut.-Col. C. A. Smart's $100,000 residence on Belvedere avenue, Westmount.

Ottawa, Ont.
Shuttleworth and Black, of this city, have been awarded the contract for erecting W. M. Southam's residence at Rockliffe, to cost about $25,000. A. Leb. Weeks, architect.

Shuttleworth and Black have been awarded the contract for alterations to Harry Rosenthal's residence, Metcalfe street, $5,000. A. Leb. Weeks, architect.

Business Buildings and Industrial Plants

Barrows, Sask.
The Red Deer Lumber Company's mills here were destroyed by fire recently. Estimated loss, $90,000.

Cobden, Ont.
Maclaren's roller mill here was destroyed by fire on the 14th inst. Estimated loss, about $30,000.

Calgary, Alta.
Plans have been filed by the McNair Fruit Company with Building Inspector Harrison for a two and a half storey brick building on Ninth avenue, between Fourth and Fifth streets west. Noted in issue of February 15th.

The new Hudson's Bay Stores will be located at the corner of Seventh avenue and First street west, with a frontage of 250 feet on the former and 130 on the latter. Estimated cost, $1,500,000. Architects, Horwood, Burke & White, Toronto. H. E. Burbridge, commissioenr; J. M. Baker, Calgary, manager.

Fort Wiliam, Ont.
The Industrial Bureau have been in communication with the president of a large stone-cutting firm in the east who are likely to locate here. G. W. Gorman, secertary of the former; Dr. W. H. Hamilton, acting chairman.

Galt, Ont.
The C. Turnbull Knitting Company will erect a 4-storey yarn factory of brick, 72 x 110.

Golden, B.C.
Tenders are invited until April 1st for erection of six chalets at Edelweiss Village near here by C. P. R. Advertisement in "Tenders and For Sale Department" of this issue.

Hillsboro, N.B.
The plaster mill here was destroyed by fire recently. Albert Manufacturing Co., owners. Hon. C. J. Osman, president.

Lethbridge, Alta.
The Western Supply & Equipment Company have called for tenders for removal of the houses on the property on which their new warehouse will be erected.

London, Ont.
The management of the Western Wire & Nail Company are seeking a site for their new works which they estimate will cost fully $250,00.

Medicine Hat, Alta.
Tenders are called until March 22nd for extension of 116 feet and changes to brick and stone station here. J. G. Sullivan, assistant chief engineer; resident engineer at Medicine Hat; division engineer at Calgary.

Montreal, Que.
It is announced that in connection with their dry dock the firm of Vickers, Sons & Maxim will establish an industry for the manufacture of large tiers for locomotives. It is also assumed that a shipbuilding plant is involved in the company's plans.

Moose Jaw, Sask.
See "Power Plans."

North Vancouver, B.C.
Messrs. Baynes and Horie, of Vancouver, have started the excavation for the three-storey brick block to be erected for Lett & Sons, on First street. The new building will have a 50-foot frontage on First street and will extend back 120 feet to the lane.

Ottawa, Ont.
The Quebec Bank, it is stated, will remove from Wellington street to Sparks street.

D. H. MacLean will erect a block on Wellington street, containing 3 stores and apartments overhead.

Frank Jarman and A. A. Baylis have purchased a property on Bank street on which a large commercial building will probably be erected for Toronto interests.

The Bell Telephone Company will erect another exchange on Bessemer st. of brick with stone trimmings, of two-storeys, with 116 ft. on Bessemer street and a depth of 40 feet. General manager, McPherson.

Peterboro, Ont.
The ratepayers will be asked to vote on a by-law covering an agreement with an automobile tire, rubber goods factory seeking location here. Commissioner Duggan.

Port Arthur, Ont.
The C. N. R. will build a large modern "bunk house" to accommodate over 200 men. Plans are almost complete. Cost, about $30,000. Gen. Supt., J. A. Cameron

Prince Albert, Sask
Andrew [illegible] formerly of [illegible] Sask., has bought the property behind the Merchants' Hotel, on which it is said that he will erect a hotel costing about $100,000. Excavation will start in the spring

Port Mann, B.C.
The plans and estimates of the United Engineering & Foundry Co., Pittsburg, Pa., have been adopted for the proposed plant for the B. C. Steel Corporation. Noted in issue of February 22nd.

Regina, Sask.
The proposed new station of the C. P. R. will be constructed with approach leading from [illegible] street and a circular drive leading to Hamilton and Broad streets. F. W. Peters, assistant 2nd vice-president, C. P. R.

St. John, N.B.
A new company to be known as White, Limited, is seeking incorporation. They will erect a new factory here.

The Safety Board have been asked to consider a proposition from a new company in regard to the erection of a cement plant at a cost of about $500,000. Capitalization, $2,000,000; President Beach, of the Pennsylvania Cement Co., is interested.

Sussex, N.B.
The Depot House, conducted by Mr A. D. Pugsley, was destroyed by fire on the 13th inst. Loss, about $50,000.

Fort William, Ont.
The Barnett- McQueen Company will install a plant for the manufacture of bolts of all kinds at a total cost of about $10,000

Sherbrooke, Que.
The Sherbrooke Scale Co. has made arrangements to erect a new factory in the spring. It is understood that the Sherbrooke Machinery Co. will also make large extensions to their plant. Plans are under consideration.

Toronto, Ont.
The work of tearing down the buildings on 35-37 King street east for the Quebec Bank, has been commenced.

Vancouver, B.C.
W. S. Ramsay has under consideration the erection of a 6-storey hotel on Melville and Burrard streets. Plans are being prepared.

The Imperial Car, Shipbuilding & Drydock Corporation, of B.C., 282 Hastings street east, Vancouver, and Washington, U.S.A., are calling for competitive plans for their car works to be located at Roche Point, otherwise known as Imperial, B.C. Estimated expenditure on buildings, equipment, etc., $350,000; buildings to be of structural iron covered with corrugated iron, etc. Machinery will cost about $150,000. The competition for plans closes May 1 at 5 p.m.

Winnipeg, Man.
Plans are being prepared for construction of a modern 12-storey hotel. E. J. Rochlon, proprietor, Leland Hotel, is interested.

Tenders were called until March 18th for excavation required for Central Y. M. C. A. J. H. G. Russell, McArthur Building, architect.

Tenders are called for erection of 6 storey warehouse for the J. H. Ashdown Hardware Company. Total cost, about $80,000. Architect, J. H. S. Russell.

The Notre Dame Block, owned by Manitoba, Ontario and Western Land Co. will be enlarged and remodelled. W. Wallace Blair, architect

It is rumored that the Hudson's Bay Company have secured a block of land on Portage avenue between Vaughn and Colony streets. Oldfield, Kirby and Girdner, Portage avenue, negotiated

The De Cew, Limited, has applied for incorporation in Winnipeg. They will go into the business of invisible lighting installations and ornamental plaster work and decorating, with branches in the west.

The Grand [illegible]

(Continued on page [illegible])

Tenders and For Sale Department

City of Moose Jaw, Saskatchewan

Main Drainage Works

[illegible] "Tender A" and [illegible] the undersigned [illegible] Clerk until 8.30 o'clock p.m., on Monday, [illegible] 1911.

Any tender received after the above-stated time [illegible].

Contract "A."

Supplying material for and constructing a [illegible], including Pump House, Sedimentation Tanks and Percolating Filter, also the supply of materials for and the laying of a Trunk Sewer and Water Main.

Contract "B."

Supplying two Electrically Driven Centrifugal Pumps and Auto Starters complete with all piping, connections, etc.

Plans and specifications for Contract "A" may be obtained from the City Engineer, Moose Jaw, upon receipt of a marked cheque for the sum of $25 to be held until the return of plans and specifications, and for Contract "B" plans and specifications will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 18th, 1911.
9-14

City of Moose Jaw, Saskatchewan

SEWER AND WATER EXTENSIONS

Sealed tenders endorsed "Tender 28," "Tender 29," "Tender 30" and "Tender 31," will be received by the undersigned City Clerk until 8.30 o'clock p.m. on **Monday, April 10th, 1911.**

Any tender received after the above stated time will be declared informal.

Contract 28.—The laying of approximately 30,700 lin. feet of tile pipe sewer, building manholes, etc.

The laying of approximately 29,700 lineal feet of cast iron water main, placing valves, valve boxes, hydrants, etc.

Contract 29.—The supplying of approximately:
29,700 lineal feet of 6-in. c.i. water pipe.
112 lineal feet of 4-in. c.i. water pipe.
132 6-in. cast iron **reverse curves.**
34 6-in. cast iron crosses.
72 6-in. cast iron tees.
29 4-in. off 6-in. cast iron tees.
28 4-in. cast iron tees.
95 6-in. cast iron plugs.

Contract 30.—The supply of approximately:
28,000 lin. feet of 6-in. vitrified tile sewer pipe.
26,600 lin. feet of 8-in. vitrified tile sewer pipe
5,225 lin. ft. of 10-in. vitrified tile sewer pipe.
1,100 lin. ft. of 12-in. vitrified tile sewer pipe.
25 8-in. tees.
75 6 in. tees.
25 8-in. ¼ bends.
100 6-in. ⅛ bends.
25 8-in. stops.
25 10-in. stops.
400 4-in. to 6-in. increasers.

..Contract 31.—The supply of approximately:
65 6-in. 3-way hydrants.
147 6-in. gate valves.
29 4-in. gate valves.
150 6-in. valve boxes.
29 4-in. valve boxes.
88 manholes, frames and covers.

Plans and specifications for Contract 28 may be seen at the office of the City Engineer, Moose Jaw, and at the offices of the Canadian Engineer at Toronto and Winnipeg.

Plans and specifications for Contracts 29, 30, and 31 will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 24, 1911.
9-14

Tenders Wanted

For a Steam Road Roller, and crushed stone for County of Middlesex.

Sealed tenders will be received by either of the undersigned until noon on **Thursday, March 30th, 1911,** for crushed stone delivered F.O.B. at the following stations on the Grand Trunk Railway, viz., Parkhill, Strathroy, Mt. Brydges, and Newbury; also F.O.B. at the following stations on the Canadian Pacific Railway, viz., Appin Junction, Caradoc, and Belmont. The contractor to quote prices for 2-in. and ½-in. stone, to be delivered in car lots as required, also at the same time tenders will be received for a ten-ton Steam Road Roller.

CHAS. TALBOT, County Engineer.
T. E. ROBSON, County Clerk.
11-12

Tenders Wanted

Sealed tenders marked "Tender for Bridges" and addressed to J. A. Smith, Esq., Clerk of Brantford Township, Ont., will be received up till noon on **Monday, April 3rd, 1911,** for the constructoin of four concrete bridges for the Municipality of the Township of Brantford.

Two of the bridges are plain concrete arches, and two are reinforced concrete girder bridges.

Plans and specifications may be seen at the office of the undersigned, Court House, Brantford.

The lowest or any tender not necessarily accepted.

JAMES A. SMITH,
Township Clerk.
11-12

Tenders Wanted

Sealed tenders addressed to the undersigned will be received up to noon of **31st March, 1911,** for all the various trades interested in the erection and completion of the new building for the Public Library in the Town of Simcoe, Ontario.

Drawings and specifications may be seen at the office of the Chairman of the Building Committee in Simcoe, and the Contract Record, 220 King street west, Toronto.

H. B. DONLY,
Chairman Building Committee,
Public Library Board.
11-12

City of Brantford

Tenders for Pavement

Sealed tenders addressed to Alderman C. H. Hartman, Chairman of the Board of Works, in care of the City Clerk, Brantford, Ont., will be received until 12 o'clock noon on **Thursday, March 30th, 1911,** for the construction of a pavement on South Market Street.

About 5,000 square yards of top surfacing, of which 800 square yards will be on a ten per cent. grade.

Tenders for different kinds of surfacing will be received.

Concrete foundation for this pavement will be laid by the City.

Single track line of Street Railway on street.

Plans and specifications may be seen, and instructions to bidders and forms of tender obtained at the City Engineer's Office.

Each tender must be accompanied by a marked cheque for 5 per cent. of the amount of the tender.

The lowest or any tender not necessarily accepted.

T. HARRY JONES,
City Engineer's Office, City Engineer.
Brantford, March 13, 1911.
11-12

To Architects

Competitive Plans

The Municipal Council of the Town of Goderich is desirous of obtaining plans for a proposed new municipal building (combined Town Hall and Fire Hall) to be erected on the site of the present Town Hall.

Conditions of competition can be had on application to the undersigned.

Plans will be received up to and including **April 15th, 1911.**

L. L. KNOX, Town Clerk,
Goderich, Ont.
11-13

Bridge Tenders

Sealed tenders addressed to the Chairman, Board of Works, Owen Sound, will be received up till 6 p.m., **Friday, April 7th, 1911,** for the following:

1. 9th Street Bridge—
(a) Steel superstructure, span 53 ft., width 40 ft.
(b) Reinforced concrete floor for same.
(c) Concrete abutments for same.
(d) Reinforced concrete arch, span 50 ft., width 40 ft.

2. 10th Street Bridge—
(a) Steel superstructure, span 69 ft., width 66 ft.
(b) Reinforced concrete floor for same.
(c) Concrete abutments for same.
(d) Reinforced concrete arch, span 66 feet, width 66 feet.

3. Removal of old bridge and construction of temporary one.

A certified bank cheque payable to the Treasurer of the Town of Owen Sound for 5 per cent. shall accompany each tender, to be returned in case of non-acceptance, and to be forfeited in case the accepted tenderer declines the contract or fails in the performance thereof.

Plans and specifications may be seen at the office of the Town Engineer.

Tenderers for steel superstructure to submit plans and strain sheets.

The lowest or any tender not necessarily accepted.

J. K. LESLIE, Chairman Board of Works.
R. McDOWALL, C.E., Town Engineer.
Owen Sound, March 7, 1911.
11-14

City of Prince Albert

Tenders for

Intercepting Sewer

Sealed tenders addressed to the Commissioners of the City of Prince Albert and marked "Tender for Sewer," will be received until noon on **Saturday, the 15th day of April, 1911,** for the construction of a Main Intercepting Sewer, as follows:
5,749 lin. ft. 4-ft. 6in. x 3 ft. concrete sewer.
4,640 lin. ft. 4-ft. 3-in. x 2-ft. 10-in. concrete sewer.
2,798 lin. ft. 4-ft. x 2-ft. 8-in. concrete sewer.
19 Manholes.

Alternate bids for Reinforced Concrete Pipe will be considered.

Plans and specifications may be obtained at the office of the City Engineer.

A marked cheque for $2,500, in favor of the Treasurer of the City of Prince Albert must accompany each tender submitted.

ANDREW HOLMES.
C. O. DAVIDSON, Commissioners.
F. A. CREIGHTON,
Prince Albert, Sask.,
March 7, 1911.
11-13

Sealed Tenders

will be received until **Monday noon, April 3rd,** for the construction, delivery and erection in place in Welland, Ont., of one unit of water power driven waterworks pumps, three million imperial gallons daily capacity, including turbine, pipes, valves, etc.

Specifications, prepared by Mr. Wm. Kennedy, Jr., Engineer, Montreal, may be obtained from the undersigned.

Envelopes to be marked "Tenders for Pumps."

R. COOPER,
Chairman Water Commissioners.
11-13 Welland, Ont.

For Sale

The Board of Power and Light Commissioners of Ingersoll, Ont., have for sale for immediate shipment, two 25 h.p. Induction motors, C. G. E. 3-phase, 220 volts, 4 Canadian General transformers, each 15 k.w. capacity, 2,200-220 volts, 60 cycles, S. P. direct current Arc Lamps, direct current motors, 220 and 110 volts from 1 to 40 h.p., and for delivery within a few weeks, steam engines, boilers and general steam plant accessories. Particulars on application.

W. R. REYNOLDS.
11-13 Superintendent.

Concrete Mixer for Sale

Ransome Concrete Mixer No. 2, complete with Engine, Hoisting Crab, bucket, charging barrows and concrete carts, all in first-class order. Cheap.

CLARKE & CLARKE, LTD.,
12-14 Christie street, Toronto.

Tenders for Road Rollers

Tenders will be received by the undersigned up to the **first day of April, 1911,** for a Steam Road Roller, prices to be given on both ten and twelve-ton rollers delivered f.o.c. Simcoe, full description of machine to accompany tender; delivery to be made on or before the first of May next.

The lowest or any tender not necessarily accepted.

W. C. McCALL, Clerk,
12-12 Town of Simcoe

Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on **Tuesday, March 28th, 1911,** for the Laying and Jointing of Water Pipes, Valves, Hydrants, and Special Castings.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained at the office of the City Engineer, Toronto.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council or officers of the Corporation of the City of Toronto, or in lieu of said sureties the bond of a Guarantee Company, approved as aforesaid.

The usual conditions relating to tendering, as prescribed by City By-law, must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.
City Hall, Toronto.
March 16th, 1911 12-13

Tenders for Cement

Sealed tenders endorsed "Tender for Cement" will be received at the office of the undersigned up to 4 o'clock p.m. on **March 31st, 1911,** for supplying 4,000 barrels, more or less, of Portland cement. Tenders will state whether cement is packed in sacks or barrels, net weight per sack or barrel, and price f.o.b. Peterborough. Sample tests will be made from consignments before acceptance. Delivery to commence not later than May 1st, 1911. A marked cheque for an amount equal to 5 per cent. of total contract must accompany each tender. Specifications furnished on application. The lowest or any tender not necessarily accepted.

S. R. ARMSTRONG,
12-12 City Clerk

Steam Shovels

We own and have for sale near Buffalo, N.Y., two Vulcan 75-ton 2½-yard steam shovels; late model, with new extra large boilers and in excellent condition; also one 70-ton. These will stand most rigid inspection and we are offering them at unusually low prices. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle Street,
T F Chicago, Ill

Tenders Wanted

Bulk and separate tenders for all or any of the several branches required in the erection and completion of a

PUBLIC SCHOOL BUILDING

to be erected in School Section No. 2, Township of West Oxford, Ont., will be received up till noon **Thursday, March 30th, 1911.**

All tenders shall be sealed, marked "Tender" and addressed to M. C. Bell, Esq., Ingersoll, Ont., Secretary School Board in above S. S.

The plans and specifications may be seen upon application to the secretary or at the office of Taylor & Taylor, architects, Hope Chambers, Brantford, Ont.

Lowest or any tender not necessarily accepted.

Brantford, Ont., March 14, 1911. 12-12

Tenders for Swiss Chalets at Golden, B.C.

for the

Canadian Pacific Railway Co.

Sealed tenders are invited for the erection of six chalets of Swiss design at the C. P. R. Swiss Village "Edelweiss," near Golden, B.C.

Plans and specifications may be obtained on application to the undersigned. All applications must be accompanied by a certified cheque for $10 [illegible] bona fide tender and the return of the plans and specifications.

Tenders are to be delivered not later than 9 a.m. on **Saturady, April 1st, 1911,** addressed to

J. S. DENNIS,
Manager Irrigation, Alberta and B.C. Lands,
Canadian Pacific Railway Company,
Calgary, Alberta.

[illegible]
12-13

Positions Vacant

[illegible]

ARCHITECTURAL DRAUGHTSMAN WANTED—[illegible] ing, London, Ont. 12-12

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No ten cents extra

ARCHITECTURAL AND ENGINEERING ASSISTANT—An Englishman at present time engaged at a large municipal corporation in England, as clerk of works, is anxious to obtain an appointment either as architect or engineer's assistant, or clerk of works. Used to control of men of all branches, 16 years in architectural, civil and electrical engineering profession. Special work, electrical power house design and erection. Reliable, 21 Smith's avenue, Hamilton, On. 12-12

Miscellaneous

Advertisements under this heading two cents per word per insertion

REPRESENTATIVES WANTED—Large American firm manufacturing waterproof coating for concrete, wants to secure reliable firm to handle their product in Canada. Good inducements. Box 243, Contract Record, Toronto, Ont. 11-12

Civil Supplies

Separate tenders will be received up to 4 p.m., **Tuesday, April 10th, 1911,** addressed to John F. Boult, City Clerk, Hull, P.Q., and endorsed:

Tenders for Construction of Artificial Stone Sidewalks, Sewer, Cast Iron Pipe, etc., as the case may be.

Specifications, forms of tender and information may be obtained at the City Engineer's Office, City Hall, Hull, P.Q.

D. CHENE, C.E. and C.,
12-12 City Engineer

To Contractors

Tenders will be received at the Office of the Secretary, School of Mining, Kingston, up to 6 p.m., of **Saturday, April 1st,** for the Cabinet Work, comprising Tables, Benches, Fume Cupboards, and other Furniture, and also Plumbing and Fitters' Works required in the completion of the Chemistry Building for the Governors of the School of Mining.

Plans and specifications may be seen at the office of the undersigned.

The lowest or any tender not necessarily accepted.

POWER & SON
Architects.
Merchants' Bank Chambers,
Kingston, Ont. 12-13

Town of Brampton

Pavement Construction

[illegible] will be received up till 6 p.m., **Monday, April 17, 1911,** for the construction of approximately 8,000 [illegible] pavement to be constructed are: 1. Asphalt Block; 2. Vitrified Brick; 3. Bitulithic; 4. Bituminous Macadam.

[illegible]

Lowest or any tender not necessarily accepted.

W. M. TREADGOLD, W. C. YOUNG,
Town Engineer Town Clerk
[illegible]

[illegible] Three Rivers, Que. [illegible] D. D. Blais, have registered.

Business Buildings and Industrial Plants

(Continued from page 55)

[illegible] with the construction of a [illegible] Winnipeg this summer. The plans have been completed and many of the [illegible] details decided [illegible].

The [illegible] will [illegible] this summer [illegible] of numerous additional buildings for their stock yards in Winnipeg. Gordon, Ironsides and Fares are extending their abattoirs at this [illegible] additional con[illegible].

Woodstock, Ont.

The [illegible] McNeill & Libby Co., of Chicago, will erect a factory to cost [illegible].

It is stated that tenders for erection of Ken-Knit factory will be called in about two weeks, plans for which are being prepared. Site has been chosen on the east side of Wilson street.

Weyburn, Sask.

Tenders are called until March 25th for erection of wholesale warehouse for the Weyburn Grocery Company. Plans, etc., at office of the Moose Grocery Co., Moose Jaw, Sask., and at office of the General Brokerage Co., Grand Forks, North Dakota, and at office of B. D. Keck, architect, Crookston, Mich.

Wingham, Ont.

The Chisholm Block was damaged by fire on the 13th inst. to the extent of $15,000. Dr. Chisholm, M.P., owner.

AWARDED

Guelph, Ont.

The contract for the new building for the Canadian Gate Co. was awarded to Cowan & Walker, $5,000.

Montreal, Que.

E. F. Dartnell has been awarded the contract for supplying about 160,000 white porcelain faced brick for the exterior of the Dominion Express Co.'s building. E. & W. Maxwell, architects; P. Lyall & Sons, Limited, general contractors.

Mr. Pierre Brault has taken out a permit for the erection of a carriage factory at 178 St. Antoine street, to replace the one which was destroyed by fire recently. The main structure will have a frontage of 94 feet by 65 feet, and will be four stories high. Rear addition will be 52 feet by 30 feet, and five stories high. It will be a brick structure; the estimated cost is $35,000. Architect, Mr. L. R. Montbriand; contractor, Henri Demers.

Ottawa, Ont.

Holbrook and Sutherland have been awarded the contract for erecting a commercial block on Queen street for Hiram Robinson that will cost about $30,000. It will be 100 feet long. Jas. Mather, architect.

Vancouver, B.C.

Work on the proposed wholesale house which H. T. Duncan will build in Vancouver will be started at once, the contract having recently been awarded to H. L. Stevens & Co., of Vancouver and Kansas City, Mo.

Winnipeg, Man.

Contract was let to Davidson Bros. for the addition of two storeys to the building owned by the Grose and Walker Company, commission merchants, 259-261 Stanley street.

Power Plants, Electricity and Telephones

Berlin, Ont.

There will be no extension of the Toronto Suburban Railway to Hamilton, Guelph, Berlin, Preston, Hespeler and Galt at present.

Fort William, Ont.

The Kaministiquia Power Co., Ltd., will require about 60 miles of standard copper wire shortly, for which contracts will be let. R. S. Kelsch, Power Building, Montreal, designing engineer.

Guelph, Ont.

Manager Hackney, Guelph Radial Railway, was authorized to secure specifications and call for tenders for construction of the St. Patrick's Ward extension.

Lethbridge, Alta.

The report of Superintendent Reid on line extensions, new street lamps and power house equipment ($1,600) was adopted by council. The estimated cost is as follows: Poles and wire extensions, $8,625; transformers, $3,000; meters, $5,000; 60 new street lamps and mast arms, $7,240; two wattmeters, water meters, frequency meters, $1,025; boiler gauge glasses, $110; total, $25,000.

Magog, Que.

The ratepayers voted in favor of the erection of a larger power dam on the Magog river. Tenders will be called shortly for construction which involves an expenditure of about $125,000. Messrs. Ross & Holgate estimate that the dam and power plant, when completed, will give an average of 1,100 h.p. Noted in issue of March 8th.

Moose Jaw, Sask.

Tenders are called until April 1st for erection of car barns and power house for the Moose Jaw Electric Street Railway Co., Ltd. Plans, etc., at office of R. G. Bunyard, architect, Bank of Commerce.

Ottawa, Ont.

Tenders addressed to the chairman of the municipal electrical department, will be received until April 6th for supply of meters, transformers, incandescent lamps, arc lamp globes, carbons, hardware and sundry supplies. J. E. Brown, electrical superintendent.

Peterboro, Ont.

Tenders are called until March 31st for supply of cement. S. R. Armstrong, city clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Renfrew, Ont.

The council have decided to proceed with the construction of the municipal power plant from plans prepared by J. B. McRae, C.E., Ottawa. Estimated cost, $100,000.

Sault Ste. Marie, Ont.

In connection with the developments of the Lake Superior Paper Company, it is stated the power company is planning the construction of another power canal and a plant capable of developing 40,000 h.p.

Simcoe, Ont.

Tenders are called for steam road roller until April 1st. Advertisement in "Tenders and For Sale Department" of this issue.

Toronto, Ont.

Tenders addressed to the chairman of the board of control will be received until March 28th for insulated copper wide. Specifications with Hydro-Electric System, City Hall.

Tenders addressed to chairman, board of control, will be received until March 28th for integrating wattmeters. Specifications at office of the Hydro-Electric System, City Hall, G. R. Geary, mayor.

The Hydro-Electric Power Commission will call for tenders for material for some ten miles of transmission lines from a point on the Severn river to the towns of Midland and Penetanguishene. Tenders will also include material for transformer stations.

Vancouver, B.C.

The plans of the Vancouver Gas Company, subsidiary to the B. C. Electric Railway Company, in the development of a gas producing plant, call for a large expenditure on plant, wharves, buildings, supply mains, etc., to the amount of about $1,500,000. Of this about $600,000 will be spent this year. Acting general manager Glover.

Winnipeg, Man.

Tenders addressed to chairman, board of control, will be received until May 1st for supply and delivery, f.o.b. Winnipeg, of ornamental lighting standards of approved designs. Plans, etc., at office of city electrician; M. Peterson, secretary.

AWARDED

Calgary, Alta.

Tenders for switchboard and apparatus for the new power station were received as follows: Canadian Fairbanks Co. (1) $4,804; (2) $6,053; Allis- Chalmers-Bullock, $5,200; Canadian General Electric, $5,700; Canadian Westinghouse Co. (1) $3,845; (2) $3,650 (accepted).

Miscellaneous

Ottawa, Ont.

Six tenders for the supplying of the city with motor-propelled fire engine were referred to Chief Graham for report. The tenders were for various types of apparatus, ranging in capacity from 750 to 1,000 gallons, and were: Ottawa Machine Company, Limited, $11,400; Webb Motor Fire Apparatus Company, $10,450; Pink, McVeity and Blackburn, $10,350; L. W. Cameron Company, $10,600 or $7,850; McDonald and Company, $9,000; Merryweather and Sons, $11,300.

St. John, N.B.

Tenders addressed to R. C. Desrochers, secretary, public works department, Ottawa, will be received until March 24th for supply and installation of appliances for fire protection to wharf and warehouses at Sand Point, St. John Harbor. Plans, etc., on application to J. K. Scammell, district engineer, St. John.

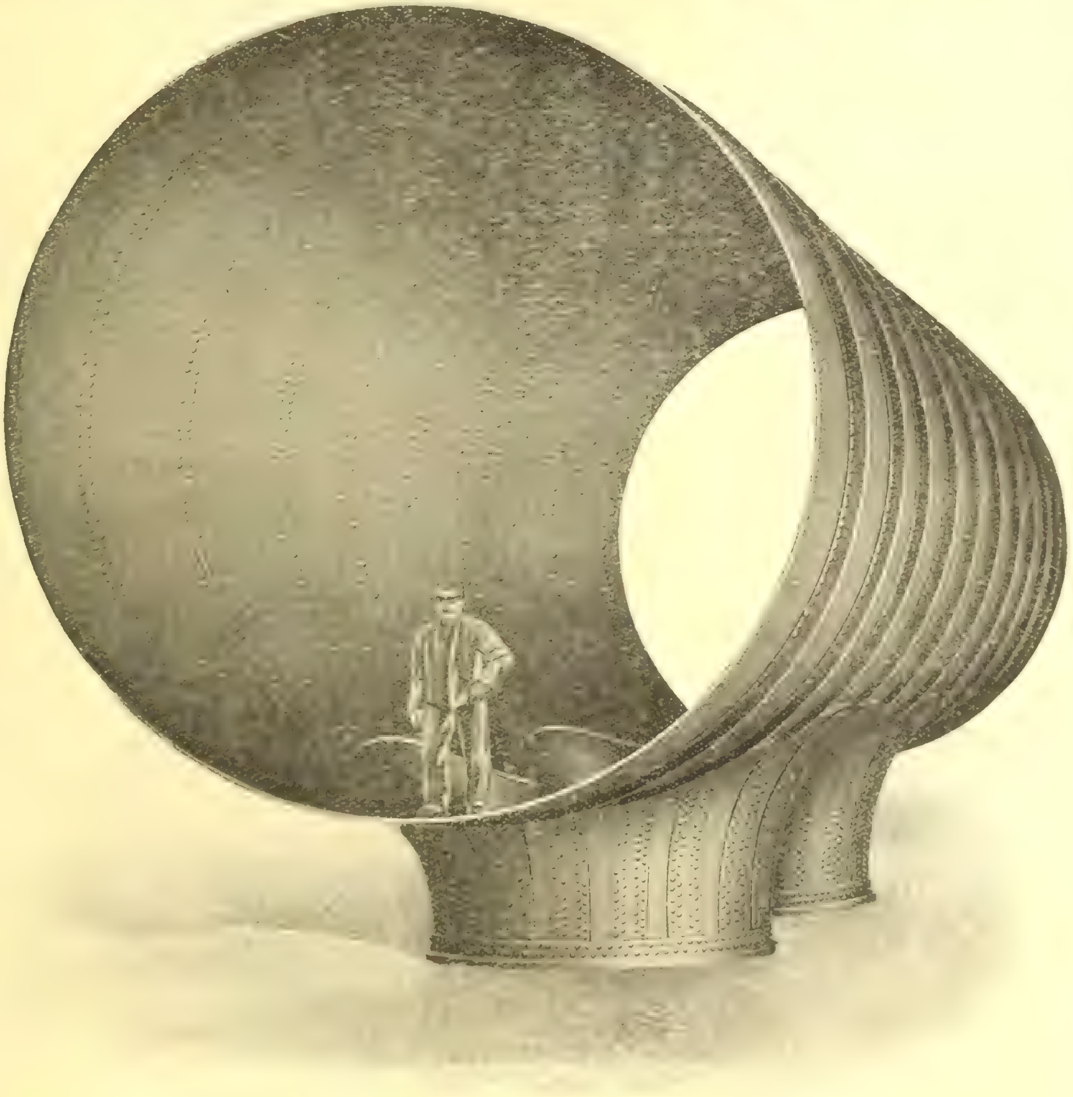
North Toronto, Ont.

The item in the issue of March 8th should have read thus: The Rogers Supply Co. were awarded the contract for supply of crushed stone at $1.30 per ton.

Vancouver, B.C.

Tenders are called until April 20th for one 85-ft. ladder truck and one chemical engine for the Vancouver fire department. Wm. McQueen, city clerk.

PENSTOCKS



Side view of Penstock Distributor built for the Ontario Power Co.

We would be glad to hear from those who have Heavy Plate work of any kind to build and especially American Companies who are contemplating the erection of Penstocks or Heavy Plate work of any description in Canada. We are specially equipped for this work.

Write us for particulars

The John Inglis Company

Engineers and Boilermakers Limited

14 Strachan Avenue, TORONTO, CANADA

The Carey Roof Standard

CAREY'S FLEXIBLE CEMENT ROOFING

[illegible] TO YOU the high standardized construction and com[illegible] of Carey's Roofing, we want to send you BOOKLET AND SAMPLE [illegible] information regarding Carey's Roofing based [illegible] proved tests. Carey's Roofing is equally adapted [illegible] steep surfaces, wood sheathing, tile or concrete. Whether you [illegible] large or small, we want to show you the advantage of using a [illegible] material. THE PHILIP CAREY MFG. Co., 60 Wayne Ave. [illegible] Branches.

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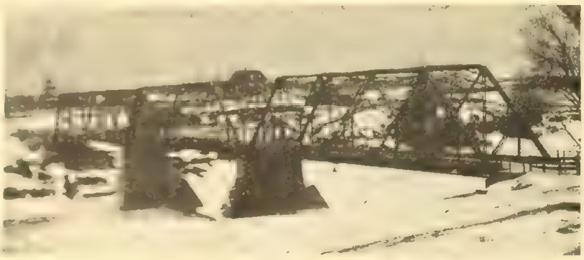
Steel Bridges

and Concrete Work

For over a quarter of a century we have been building Steel Highway Bridges throughout Canada.

Our experience is at your disposal.



We also manufacture Standpipes and Elevated Tanks, Steel Piling, Boilers, etc.

Get our figures before closing your contracts.

The Hunter Bridge & Boiler Co., Ltd.

Kincardine, - Ontario.

Tenders

A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

Personal News and Notes

Mr. D. T. Black, of Campbellton, N.B., has been engaged as town engineer of Welland, Ont., at a salary of $90 a month.

Sir Thomas Shaughnessy left New York recently for a six weeks' tour of Great Britain and the Mediterranean. He will return to Montreal about the end of April.

Mr. Jno. Haddin, of the John Galt Engineering Company, Winnipeg and Toronto, was recently in Cranbrook, where his firm is reporting on the installation of a sewerage system.

Mr. F. L. Fellowes, the newly appointed supervising engineer, of Vancouver, B.C., is due to arrive at the coast early in April. He severs his connection with the city of Westmount at the end of this month.

Mr. J. D. McArthur, the well-known Winnipeg railway contractor, returned recently with his wife to the western capital after an enjoyable trip to southern California. Mr. McArthur is one of the best known contractors in the Dominion. Among his recent noteworthy works may be mentioned the Winnipeg-Lake Superior Junction line of the National Transcontinental Railway. He owns several thousand square miles of timber limits in British Columbia.

Mr. E. A. Wickam, brother of D. P. Wickham, the railway contractor, of Edmonton, Alta., when recently in that city, stated that United States railway contractors are looking to Western Canada for work during 1911. This is owing to the action of the United States Inter-State Commerce Commission in forbidding an advance in rates by the railroads, as a result whereof the companies are curtailing their construction programmes considerably. Mr. E. A. Wickam has been associated with his brother in several important contracts in western Canada and is well known in the province of Alebrta. He is general manager of the Cincinatti, Hamilton & Dayton road, controlling some 1,200 miles of railway. He is devoting close attention to developments in the Canadian field.

Quebec Builders' Exchange

The second annual banquet of the Quebec Builders' Exchange was held at the Kent House at Montmorency Falls on the 25th ult. Those present included the premier of the province, Sir Lomer Gouin, Hon. L. A. Taschereau, Minister of Public Works for Quebec, and his Worship, Mayor Druoin. Mr. E. T. Nesbitt, president of the exchange, was in the chair. Sir Lomer Gouin and Hon. Mr. Taschereau replied to the toast of the Province of Quebec. The premier laid particular stress upon the value of technical education and assured those present that his best efforts would be put forth in its behalf. The Provincial Government had created schools for architecture, surveying and forestry engineering and it was to be hoped that these technical schools would multiply in large centres and so stimulate interest in skilled labor.

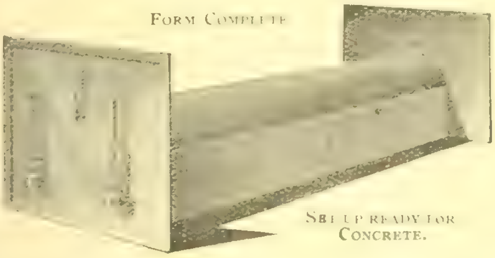
Hon. Mr. Taschereau congratulated Mr. Nesbitt upon his re-election as president of such an important organization as the Canadian National Association of Builders. The speaker concluded with an explanation of his workmen's compensation bill and incidentally referred to the prospect of lower insurance rates in the near future. Mayor Drouin, responding to the toast, "The City of Quebec," gave a number of substantial reasons for his belief that an era of progress and activity was ahead of the ancient capital. Plans had been accepted for a group of work shops for the Transcontinental. These comprised some 28 buildings, which would likely employ thousands of workmen.

Mr. D. Ouelett responded to "The Architects," and Mr. Jas. Ballantyne, president, Montreal Exchange, to "The Builders' Exchange of Montreal."

COLLAPSIBLE STEEL FORMS

For the Building of

Culverts, Conduits, Small Bridges, Sewers, Etc.



Our Collapsible Steel Forms are the lightest, strongest and most durable made. They combine in the simplest way every requirement for rapid and practical work, and are attracting wide attention. They are highly endorsed by road and street officials, contractors and engineers everywhere.

WRITE FOR FORM CATALOGUE
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COMMISSIONER'S TIME BOOK FREE

Concrete Form & Engine Co.

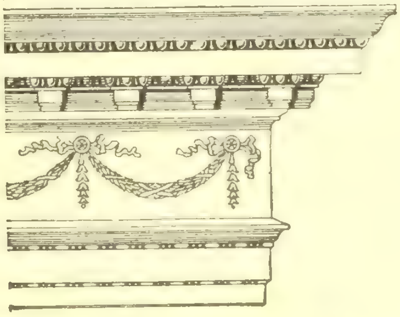
Successor to Collapsible Steel Form Co.

83 Congress St., W., Detroit, Mich.

"A good [illegible] well built, a monument to the builder."

Superior Quality Material and Workmanship Count

Metallic Cornices



are the MOST ARTISTIC, MOST DURABLE and MOST EASILY ERECTED cornices you can place on any building.

They are made of sheet copper or galvanized steel and are absolutely rust proof.

"Metallic" cornices can be furnished in any design desired to suit your drawings and specifications.

Let us give you prices and full information--send us your specifications. Our catalogue of sheet metal building materials, No. 70, will interest you. Write for it.

Manufacturers 191

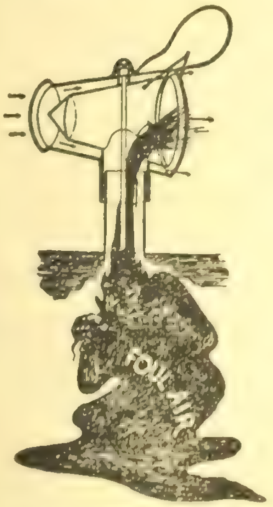
The Metallic Roofing Co Limited

TORONTO & WINNIPEG

AUTOFORCE VENTILATING SYSTEM

PURE AIR

Positively No Down Draft



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Autoforce Air Pump Ventilator

Write us for full Particulars

No fixed charges, power or repair bills. Requires no oil and is absolutely noiseless.

Unsurpassed for ventilation of Schools, Churches, Theatres, Offices, Work Rooms or for Chimneys with poor draft.

THE FORCE DRAFT is obtained by natural laws in its construction for the removal of impure air, securing perfect ventilation and preventing the entrance of objectionable matter. Expensive appliances heretofore used to produce a draft, are not required.

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Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
45 BROADWAY, NEW YORK

Terra-Cotta Fireproofing

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Birch, Mahogany, Plain Oak, Quartered Oak, Cypress, etc.

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Manufacturers of Fine Woodwork
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"The best is cheapest"

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Composition Flooring

Guaranteed durable, jointless, noiseless; fire, water, insect and dust proof
For Churches, Hospitals, Hotels and all public buildings it is unequalled. Its use in private houses for bath rooms, kitchens, verandahs, etc. has always given the greatest satisfaction.
Our imitation marble is perfect. Testimonials on application Estimates on all classes of work free. Distance no object. Write for samples

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Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

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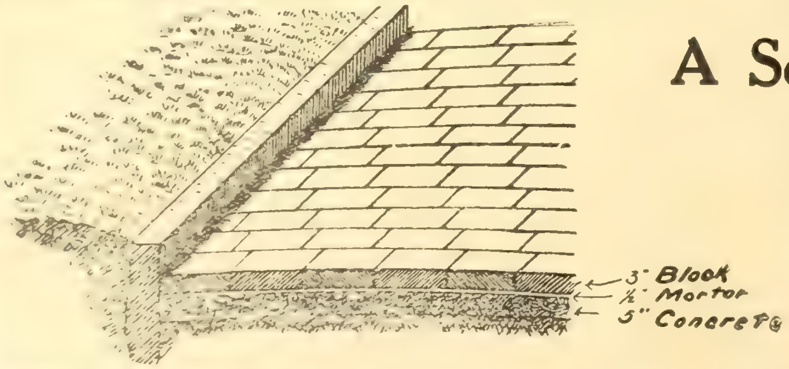

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Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by

Asphalt Block Pavements

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Start Right

by specifying Hamilton Pressed Brick for every job where a clean, smooth and distinctive effect is desired.

Hamilton Pressed Brick is made from shale, not clay, rich in Iron Oxide free from so called Soda. Besides furnishing this high class product we can fill your orders promptly. Connections with T. H. B., C. P. R., G. T. R., M. C. R.

Hamilton Pressed Brick Company
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Factory 1992
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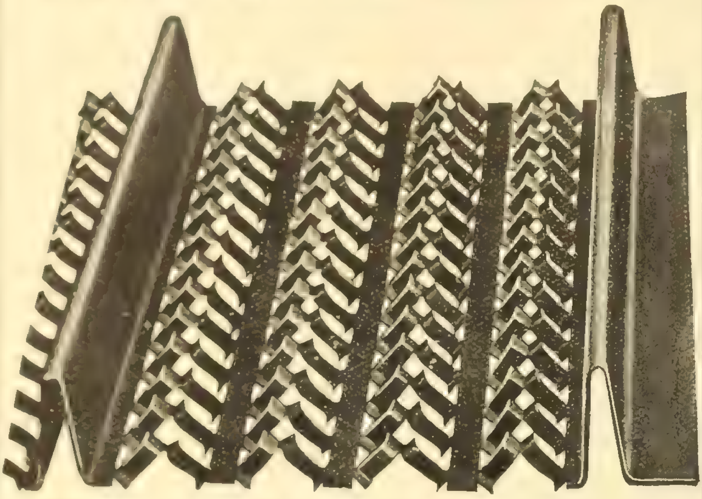
Spectator Building, Hamilton, Ont.

KAHN SYSTEM
Products include
HY-RIB

Combination of metal lath and channel in one sheet. Does away with expensive wiring and studding, also Form work when used as reinforcement for floor or roof slab.



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Built for Every Service
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Electric Traveling Cranes, Standard
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ENGINES and BOILERS of all types and sizes, Heaters, Tanks, Pumps etc
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THE COMMERCIAL
The Weekly Financial Commercial & General Trade Newspaper of the Great West
Winnipeg, Manitoba

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MAXWELL
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Cumberland County Quarries
Red and Grey Freestone
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High-Grade German Brands for Granolithic and Artificial Stone Sidewalks. SEWER PIPES, CULVERT PIPES, etc. Best English Cements. Best Belgian Cement.
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Robert W. Hunt & Co. Engineers
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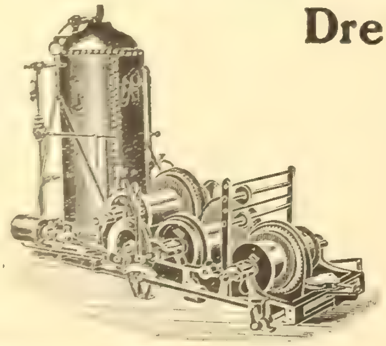

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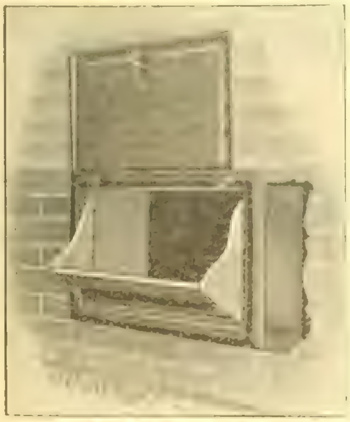
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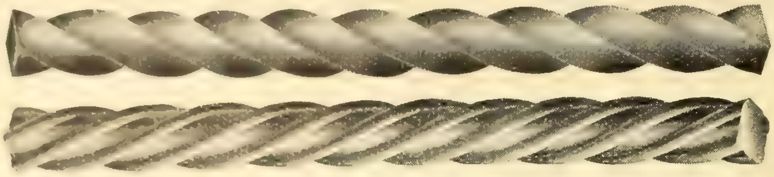

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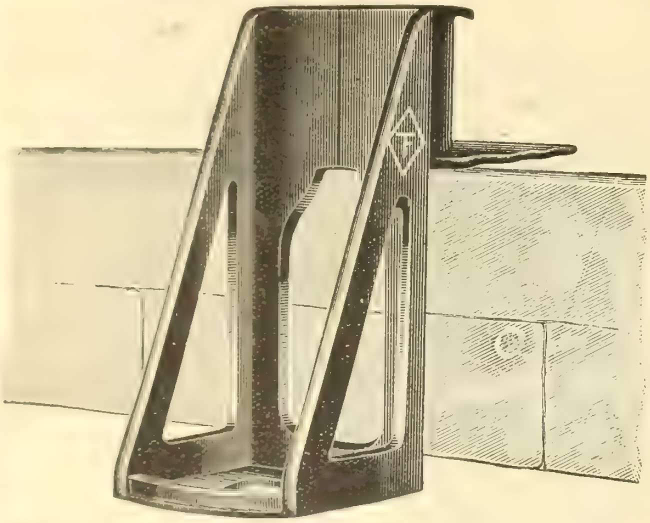

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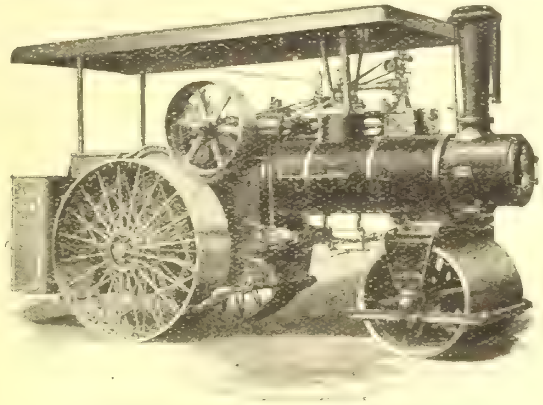

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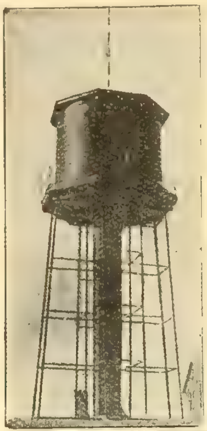

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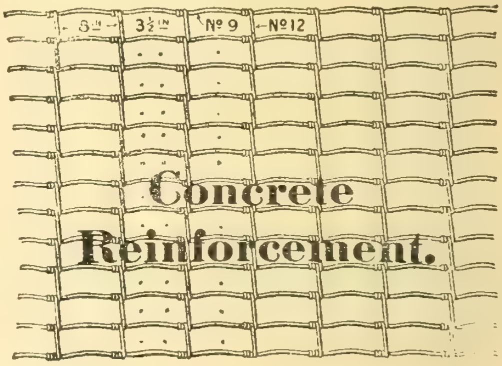

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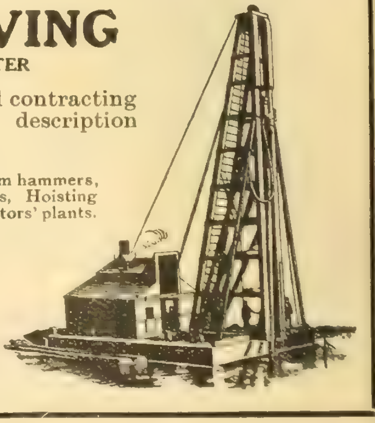

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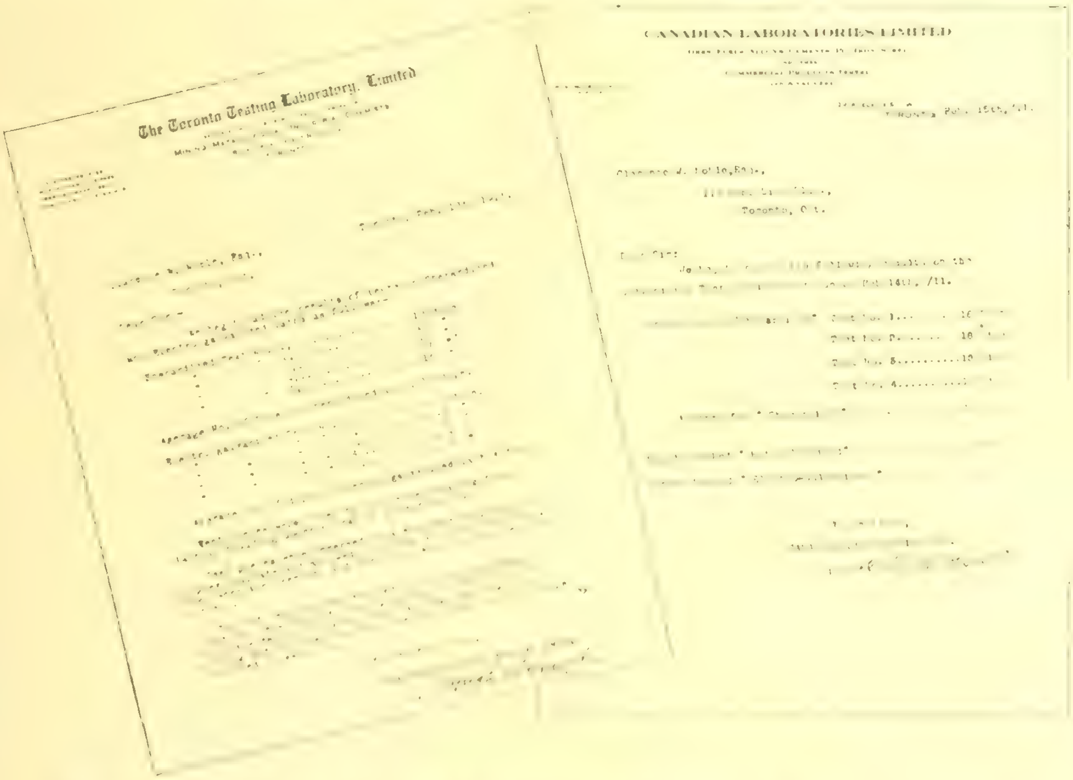

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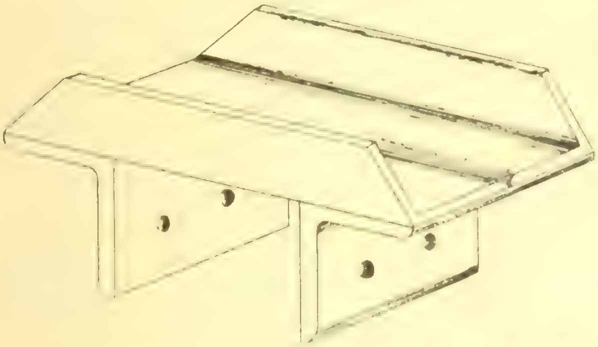

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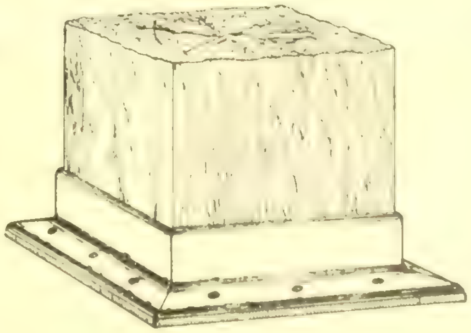

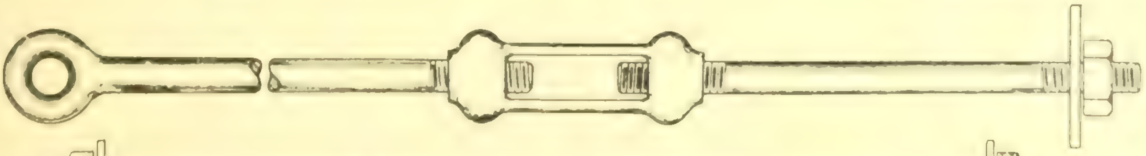

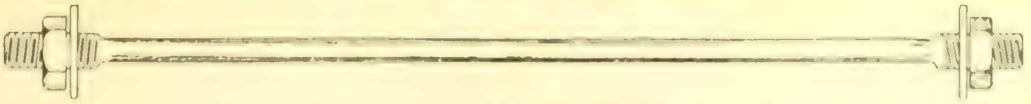

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Current Prices of Building Material.

BRICKS.

The following are wholesale prices delivered at Toronto:—

	Per B.
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work....	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches......	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50

Brass Goods, Valves, etc.

96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES.

(Installed in Toronto.)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—½-inch square, 65 cents.

Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

Vitreous Tile—All sizes, according to color, 55 to 65 cents

Glazed—White, 6 x 3 inches, 55 cents per square foot.

Matt—Dull finish colors, first, 70 cents.

Capping Coves and Corners, special quotations to suit requirements.

Opalite Tile—3-16 inch No. 1 standard, size 6 x 8 inches, 6 x 2 inches, 60 cents.

White glass, installed, 6 x 8 inches, 80 cents.

STEAM FITTERS' AND PLUMBERS' SUPPLIES.

Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 70 per cent.; roundway, 65 per cent.

No. 4 compression bath cock ....net	$1.65
No. 4½ Fuller's ....net	2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range.

30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks.

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe.

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings.

Medium and extra heavy pipe and fittings, up to 6-inch, 75 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 per cent.; fittings, 70 and 10 per cent.

CEMENT, STONE, STEEL, Etc.

Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.70.

Crushed stone, 2-inch, $1.30; 1-inch, $1.35; ⅜-inch, $1.40.

Binder stone, $1.35 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Brown sills and beads, in the rough, delivered, 40 cents per foot.

Rubble stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

Steel channels and beams, $2.60 per 100 pounds, delivered f.o.b. Toronto.

Expanded Metal, No. 10 gauge, 3½ cents per square foot.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

Lime, per cwt., delivered, 38 cents.

Plaster of Paris, per barrel, delivered, $2.20.

Manilla Rope, best, per pound, 15 cents.

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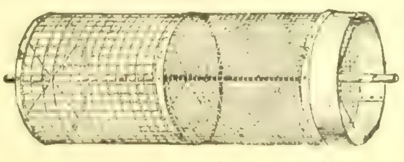

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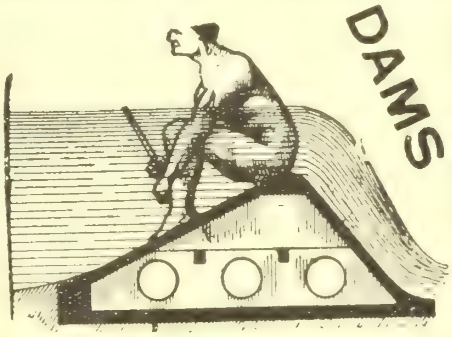

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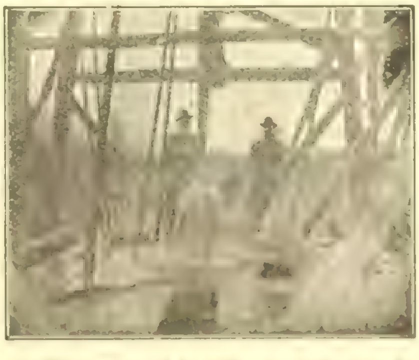

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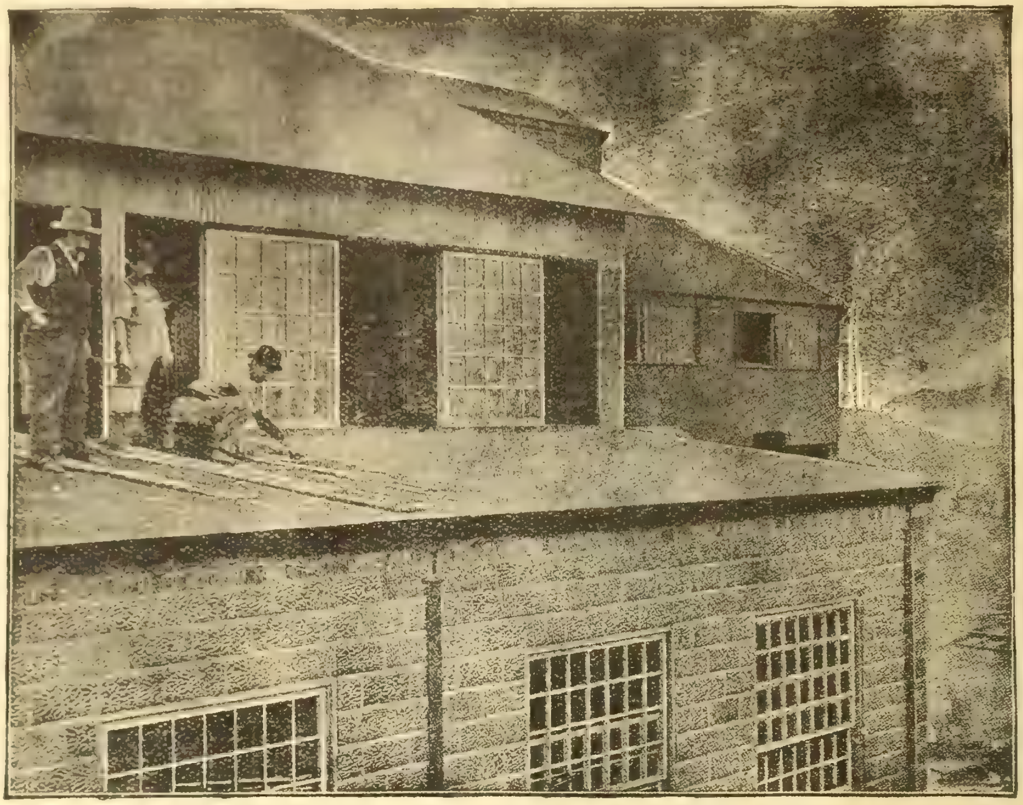

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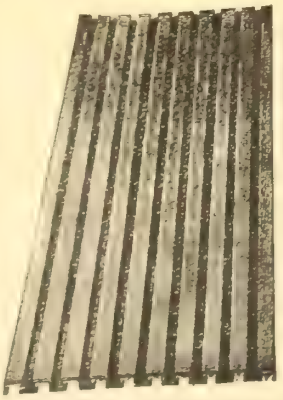
Plates, which have been laid to form a roof. The under side of these plates is plastered. This is a good example of a roof that is both fireproof and timeproof—the two qualities in which Pedlar Ferro-Dovetail Plates stand preeminent. A roof in which Ferro-Dovetail Plates are used, made of steel and cement, has not an ounce of combustible material in it. The steel plates being concreted on the upper side and plastered on the lower side, are so perfectly protected, that gases, acid fumes, atmospheric conditions or any other injurious influence cannot harm them.



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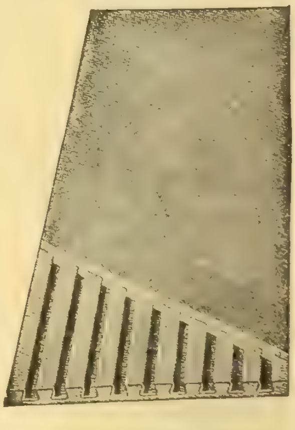

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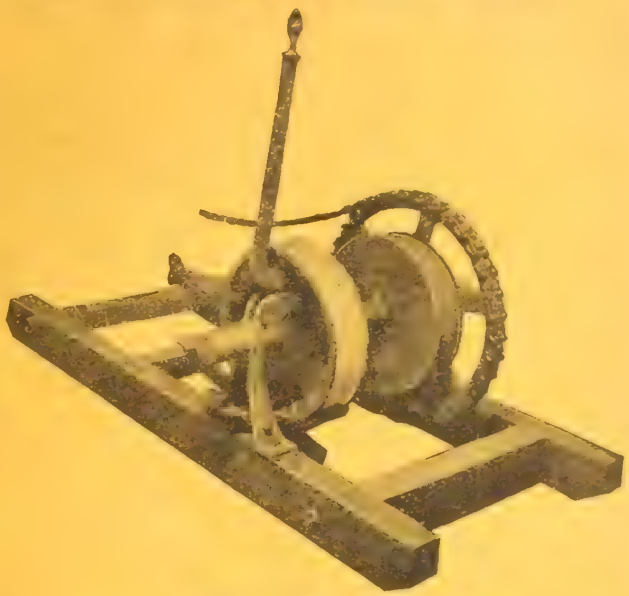

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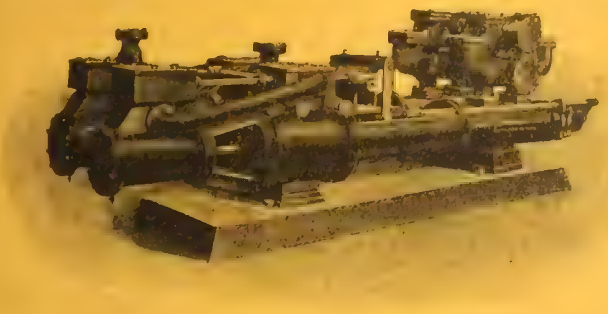

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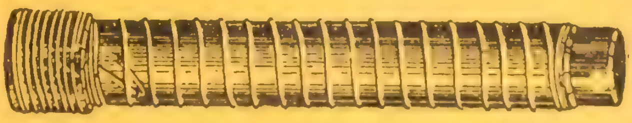

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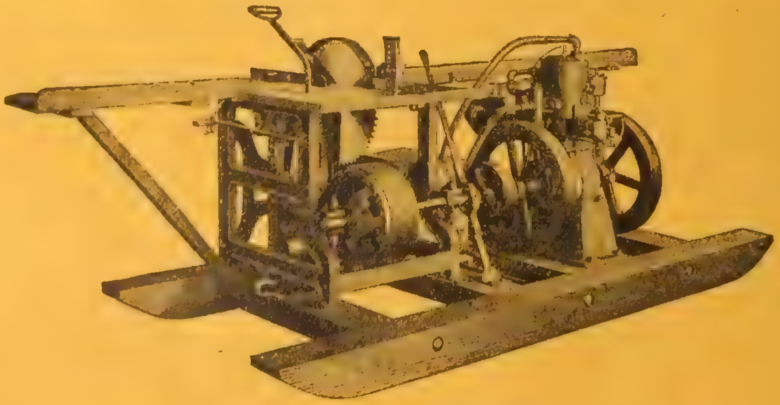

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OSHKOSH, WISCONSIN

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Now it will be readily understood

that out of the mass of enquiries that come to us, there are a number that include questions as to what might be termed Allied Industries. These we now answer to the best of our ability, but we could answer them still more satisfactorily, if manufacturers of materials used in conjunction with cement would co-operate to the extent of sending copies of their catalogues and other literature to be placed on file in our office for reference.

We should like to obtain

the names and addresses, together with catalogues, and any other obtainable information of manufacturers of and dealers in:

1. **Concrete Machinery**
2. **Building Blocks**
3. **Cement Bricks**
4. **Tile Molds**
5. **Fence Posts**
6. **Re-inforcing Material**
7. **Water-proofing Compounds**

It is not alone for our own convenience that we make this suggestion; firms who manufacture or deal in such articles will find it to their own advantage to have this information in the hands of our Information Department, thereby enabling us to hand on to them from time to time enquiries for such materials as they severally make.

In sending catalogues, literature or information, please address same to "Sales Department."

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Limited,
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No. 649 —35-ton Vulcan Steam Shovel, 1¼ yard dipper.
No. 1025—45-ton Bucyrus Steam Shovel, 1½ yard dipper.
No. 1049—35-ton Little Giant Steam Shovel, 1¼ yd. dip.
No. 1176—70-ton 2½ yards Bucyrus Steam Shovel.
No. 1177—70-ton 2½ yards Bucyrus Steam Shovel.

Locomotives

No. 1050—One "Davenport" Locomotive, saddle tank, 36-in. gauge, 16 tons.
No. 1051—One "Porter" Locomotive, saddle tank, 36-in. gauge, 10 tons.
No. 1052—One "Kingston" Locomotive, saddle tank, 36-in. gauge, 16 tons.
No. 1115—One "Kingston" Locomotive, saddle tank, 42-in. gauge, 16 tons.
No. 1178—Two "Porter" Locomotives, saddle tank, 36-in. gauge, 18 tons.
No. 1179—Two "Porter" Locomotives, saddle tank, 36-in. gauge, 18 tons.
No. 1180—One "Davenport" Locomotive, saddle tank, 36-in. gauge, 12 tons.

Dump Cars

No. 1053—15 Dump Cars, 3-yard capacity, 3-foot gauge, one way dump.
No. 1054—15 Dump Cars, 3-yard capacity, 3-foot gauge, two way dump.
No. 1118—25 Dump Cars, 2-yard capacity, 3ft. 6in. gauge, two way dump.
No. 1127—92 Dump Cars, 5-yard capacity, standard gauge, "Austin."
No. 1169—10 Dump Cars, ¾-yard capacity, 2-foot gauge, "Koppel."
No. 1181—60 Dump Cars, 4-yard capacity, 3-foot gauge, "Western" and "Continental."
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No. 1189—12 Dump Cars, 6-yard capacity, standard gauge, "Continental."

Concrete Mixers

No. 274 —No. 0 Smith Mixer on skids with driving pulley.
No. 944 —No. 1 Smith Mixer on trucks with gasoline eng.
No. 1192—No. 0 Smith Mixer on trucks, with engine and boiler.
No. 1077—No. 5 Smith Mixer on skids.
No. 1088—No. 1 Smith Mixer on trucks, with engine and boiler.
No. 1104—No. 0 Smith mixer on trucks, with engine and boiler.
No. 1114—No. 2½ Smith Mixer on trucks, with engine and boiler.
No. 1128—No. 1 Smith Mixer with gasoline engine.
No. 1137—One Hanes Mixer.
No. 1166—2 No. 4 Ransome Mixers on skids with engine and measuring hopper.

Crushers

No. 663 —No. 4 10 x 18 Austin Jaw Crusher on wheels.
No. 1079—No. 2 Austin Gyratory Crusher on truck with 14-ft. elevator and chute screen.
No. 1096—No. 6 Austin Gyratory Crusher.
No. 1122—One Blake-Marsden Stone Breaker, 1½-in. throw.
No. 1173—No. 3 Austin Gyratory Crusher with 30-ft. elevator and screen.

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No. 1186—1 Marsh & Henthorn 6¾ x 10, double cylinder, double drum Hoist with boiler.
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No. 1164—One 40 h.p. Vertical Boiler with stack and fittings.

No. 1165—One 30 h.p. Vertical Boiler, 9 x 4, with stack and fittings.

Buckets

No. 1124—One Hayward Class C Clam Shell Bucket, ¾-yd

No. 1167—Two ¾-yard Hayward Clam Shell Buckets.

No. 1168—Four Stuebner and similar type bottom dumping buckets.

Pumps

No. 904 —One 8-in. Rotary or suction pump with about ten feet suction and 15 feet discharge pipe.

No. 1132—One Duplex Patent Steam Pump, 3½-in. suction and 2½-in. discharge.

No. 1138—One 18-in. direct connected Centrifugal Pump.

No. 1139—One Large Duplex Worthington Plunger Pump.

No. 1184—Two Goulds 8 x 6 direct connected Centrifugal Pumps.

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Derricks

No. 1159—One stiff leg derrick, Dobbie, five ton fittings complete.

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No. 1191—About 100 tons 20-lb. relayers with plates.

No. 1125—100 tons 56-lb. relayers with fish plates and bolts.

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No. 902 —2 Ingersoll Steam Drills complete with fifty feet steam hose.

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No. 1057—7 No. 3 K. & J. wheel scrapers, round pan.

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No. 1081—6 No. 3 Canada wheel scrapers.

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No. 1069—1 Little Leonard Engine

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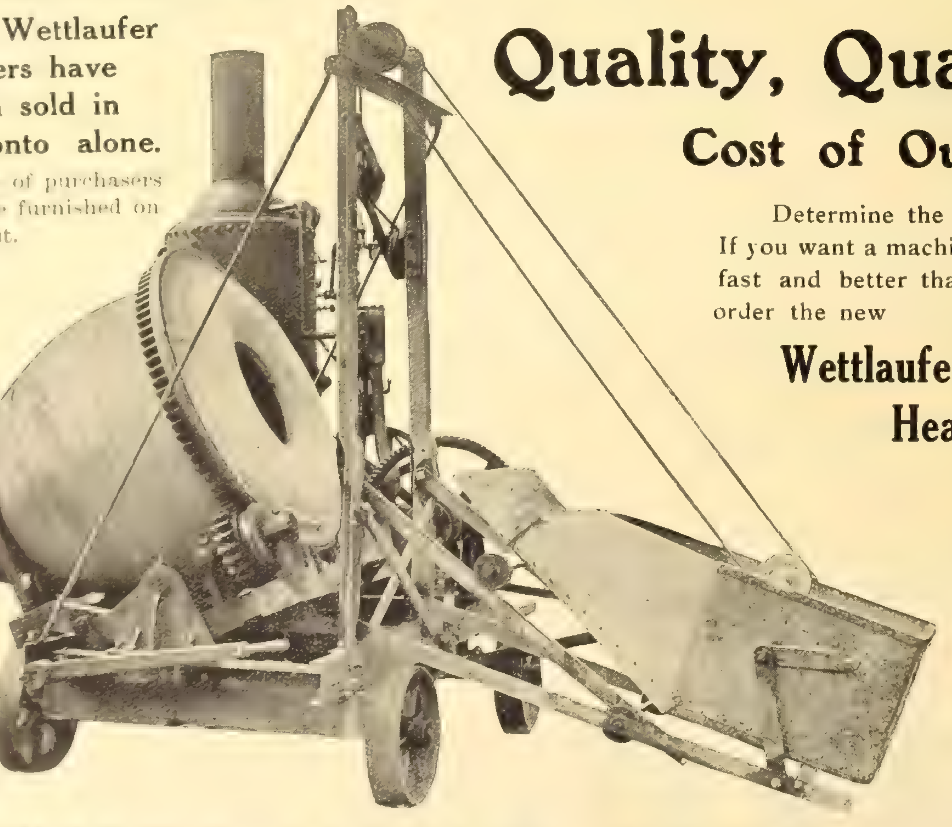

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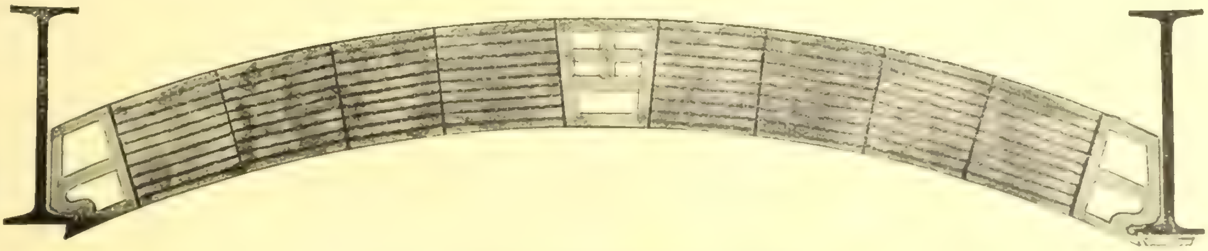

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The only Mixer that will not spill when overcharged

Low charge and high discharge
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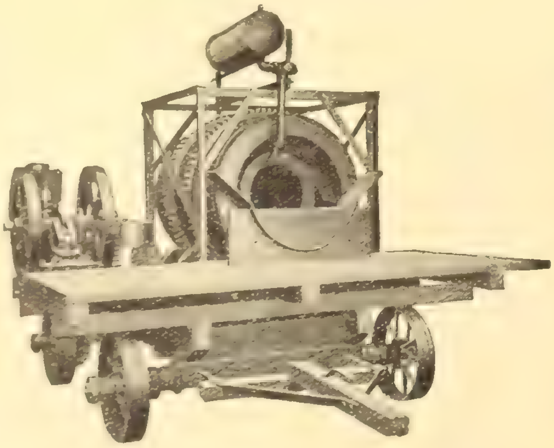

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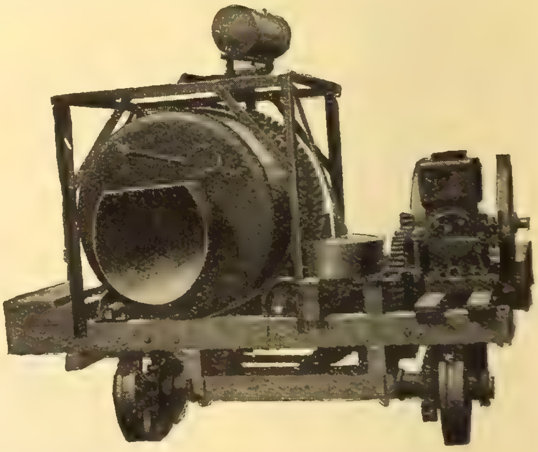
Steam or
Gasoline
Engine



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The only mixer having batch
constantly in sight of operator.

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We carry machines in stock at Kansas City and St. Joseph, and can make immediate deliveries

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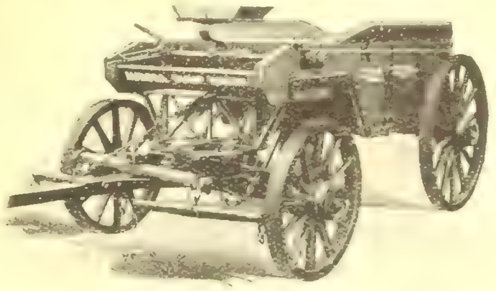
That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the



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Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.

Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.

Slotted hinges on doors give vertical movement, preventing installing team on dump.

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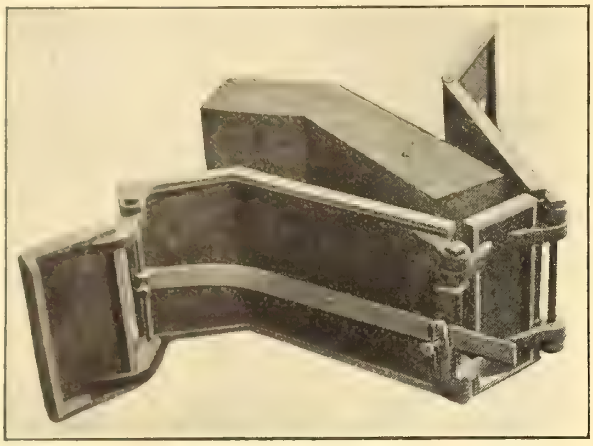

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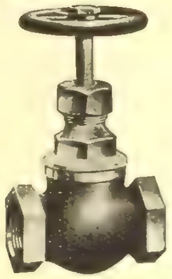

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VALVE AND HYDRANT MANUFACTURERS
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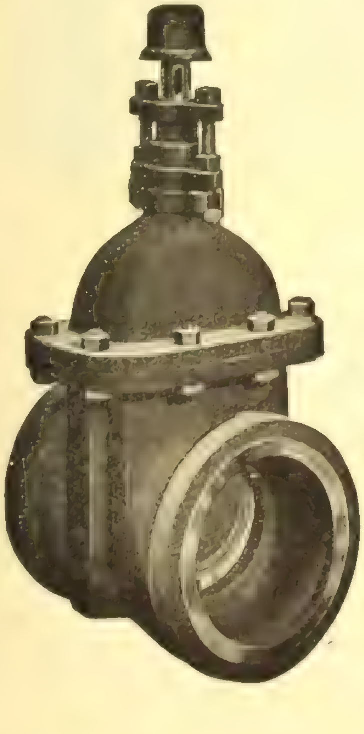

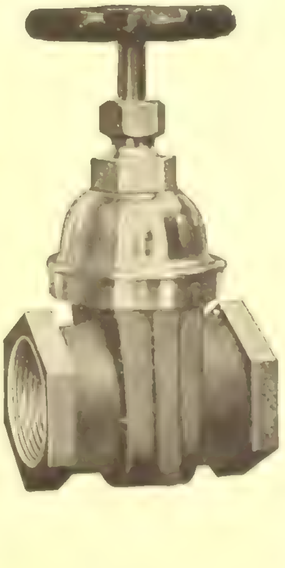

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Continuous Re-inforced

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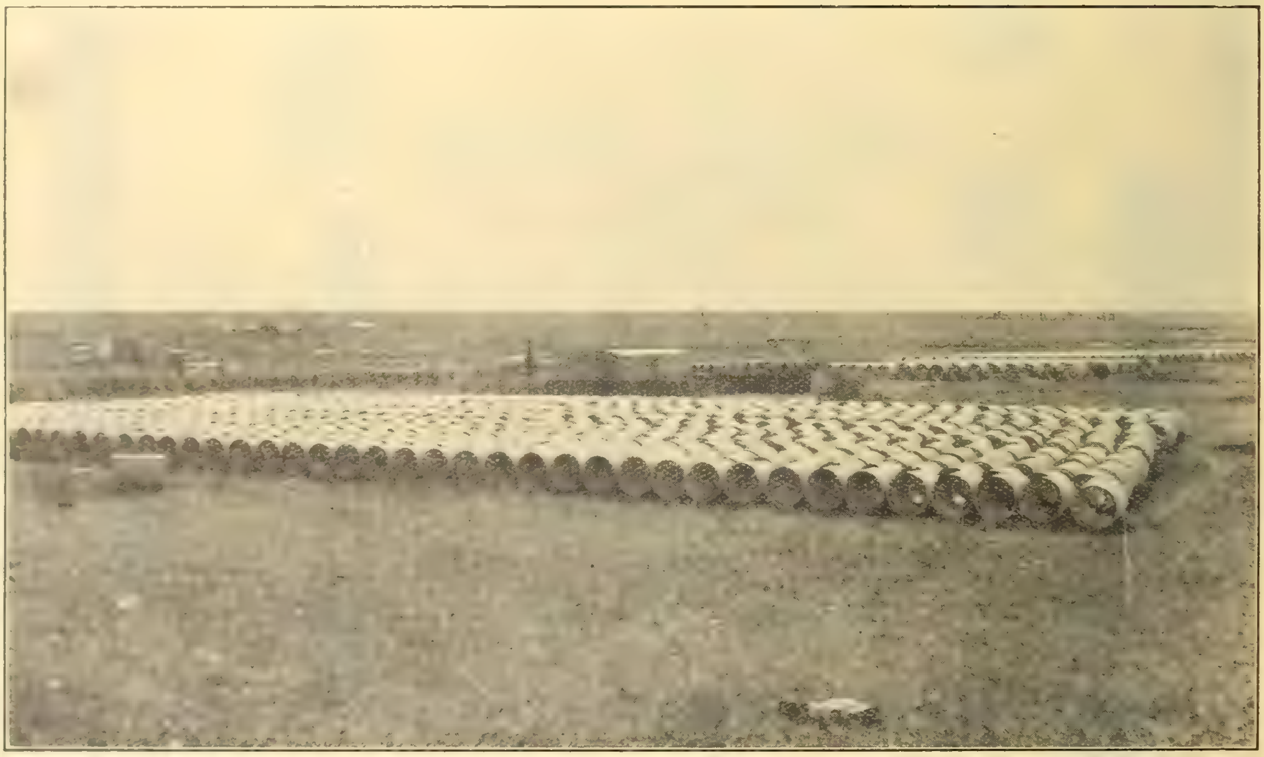
Patented



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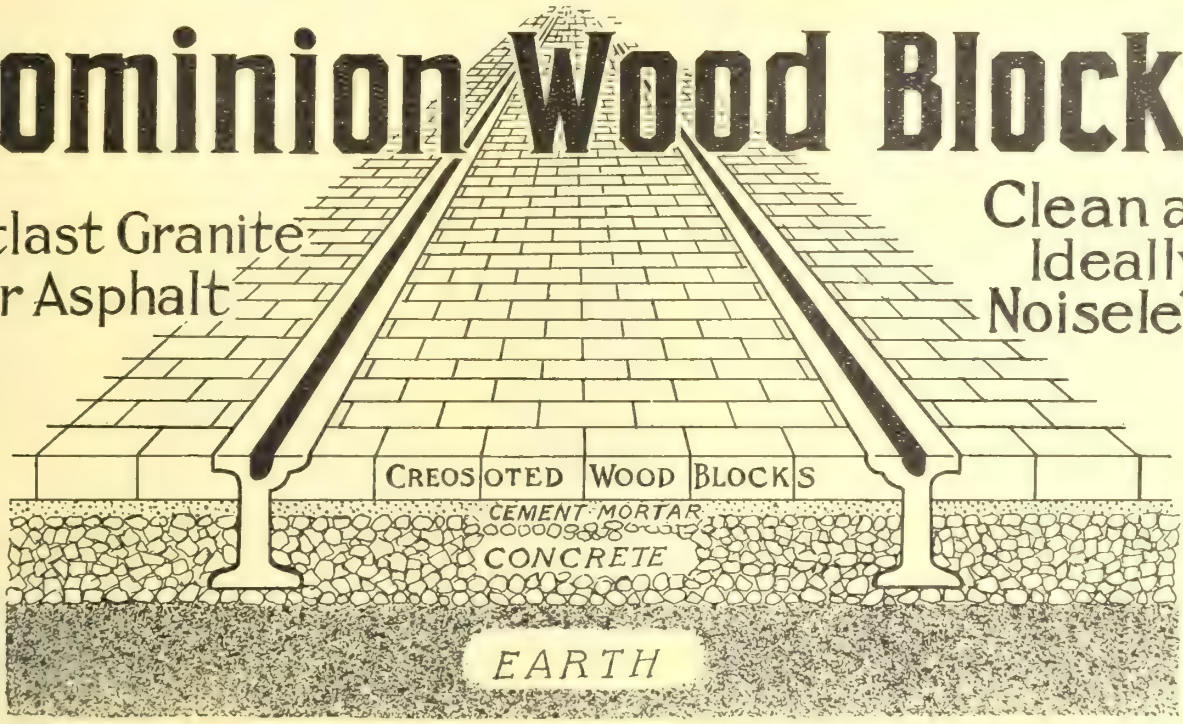

Outlast Granite or Asphalt

Clean and Ideally Noiseless

Dominion Wood Blocks

make the most durable pavement for all classes of service, from the lighest wear of boulevard vehicles to the grinding of the heaviest trucking traffic. It is the one pavement that won't need the annual attention of the repair gang and will pass out of reserve in perfect condition.

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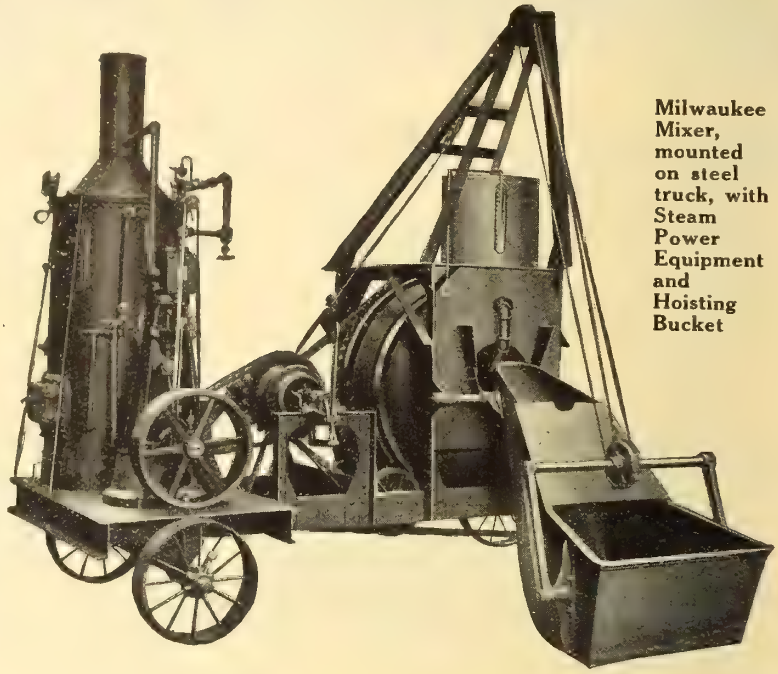
Vancouver, B.C.

Milwaukee Concrete Mixer

Rosebery's Unequaled Proposition and one that is booking the orders. Write for 1911 Catalogue. Just out.



Milwaukee Mixer, mounted on steel truck, with Steam Power Equipment and Hoisting Bucket

OUR PROPOSITION

WE will put a Milwaukee Mixer on your work for a period of five days. You are at liberty to test it thoroughly in every kind of work. If, at the expiration of this time, you are not fully convinced that it is all we claim and superior to any concrete mixer in the market, return it to us and we will pay the freight both ways.

No firm ever made, or can make, a more straightforward offer than this, as it will not cost you a cent if we fail to convince you of the superiority of the MILWAUKEE CONCRETE MIXER.

Milwaukee Concrete Mixer and Machinery Co. - Milwaukee, Wis., U. S. A.

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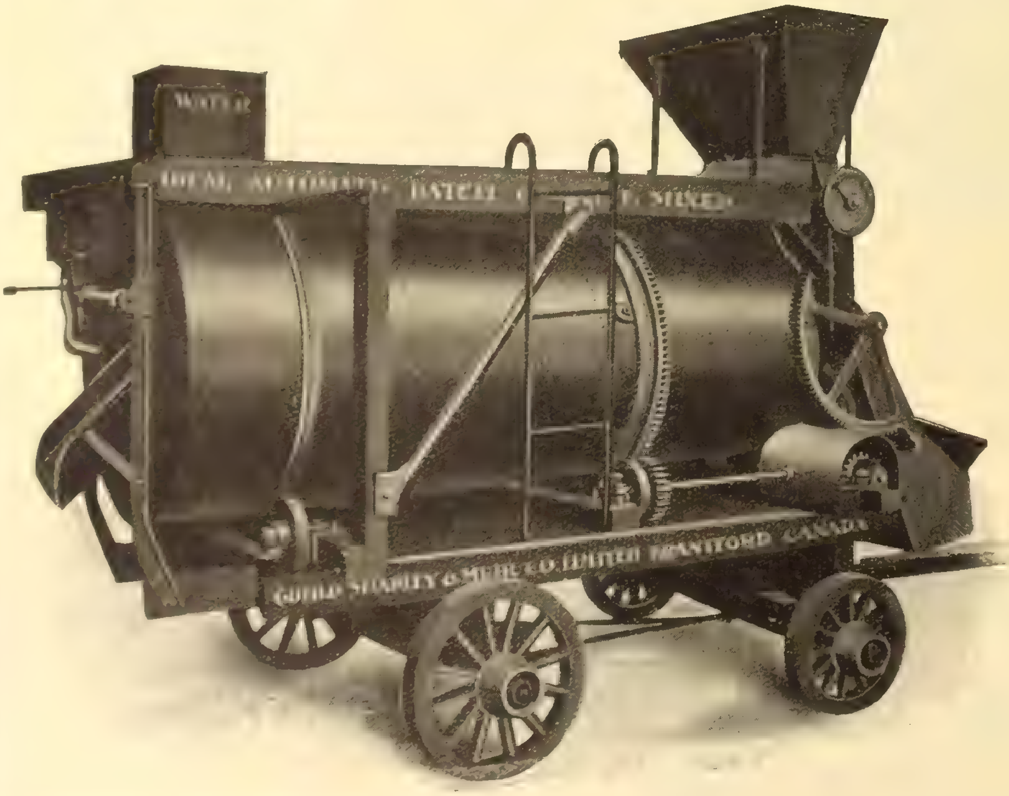
The Stuart Machinery Co., Winnipeg, Man. **C. W. Stancliffe & Co.,** Vancouver, B.C.

CONCRETE MIXERS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IDEAL AUTOMATIC BATCH MIXER
GOOLD SHAPLEY & MUIR CO. LIMITED BRANTFORD CANADA

Our 1911 machine has all steel frame, Heavy Steel Gears; is the most up-to-date mixer made. It is a money maker.

We make

Tanks and Towers

for all purposes and any sizes. Gas and Gasoline Engines, etc.

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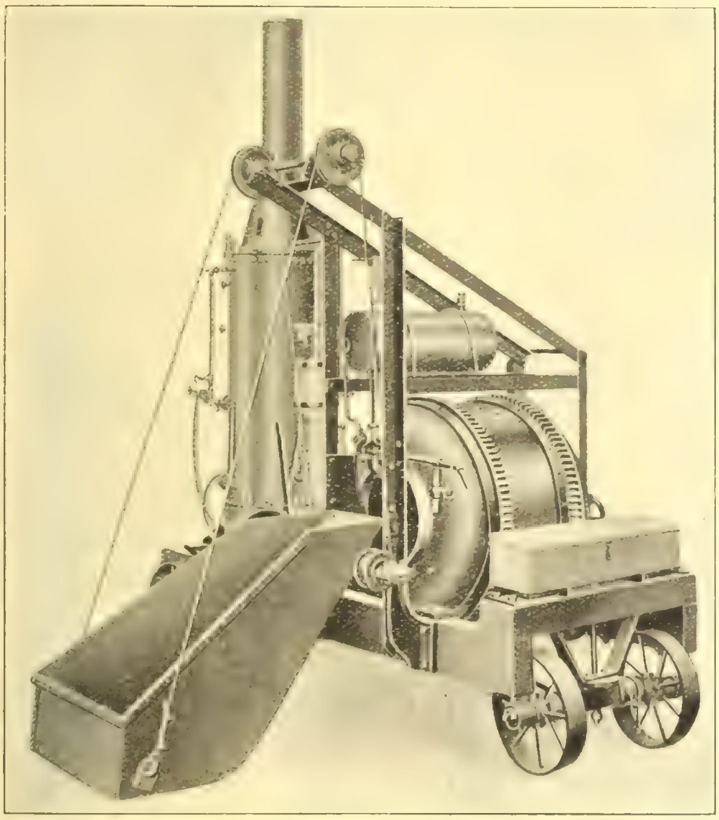
The
GOOLD SHAPLEY & MUIR CO. LTD.
Brantford, Canada

Better Concrete for Less Money



Concrete Mixer theories grow into definite mixing knowledge when every mixing action is a known positive mechanical force.

There's an individuality about Koehring Mixing—it's known mixing.

The drum is a plain cylinder with heavy cast iron heads, but bear in mind, it's made without deflecting faces or other obstructions, to limit the end-to-end mixing.

The mixing blades are so arranged that they not only lift and pour the aggregates from the side but carry them alternately from end-to-end and break them over against the heavy heads.

There's no guess work about it—no rolling over in the centre of the drum, every action of the aggregates is performed by a known positive mechanical force.

But there's another mixing than this in the Koehring Mixer.

When not in discharge position, the inner end of the discharge chute is tilted downward.

Material carried up by the mixing scoop at the side is discharged onto the inwardly and downwardly extending chute and decends from the inner end in a continuous flow, the entire width of the chute, and falls to the bottom at right angles to that from the mixing scoops and the end-to-end mixing.

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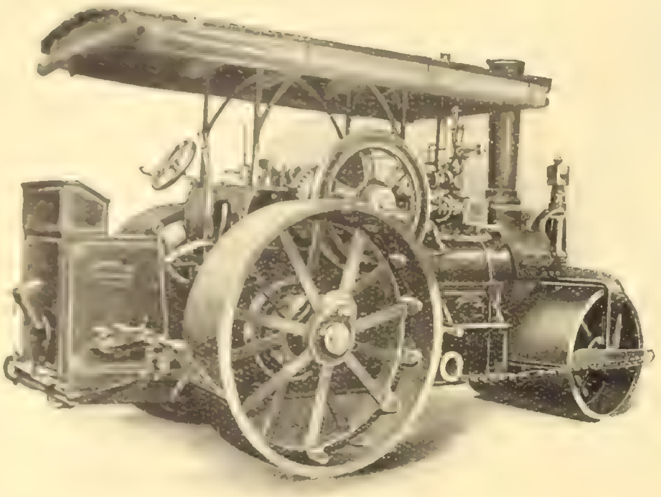

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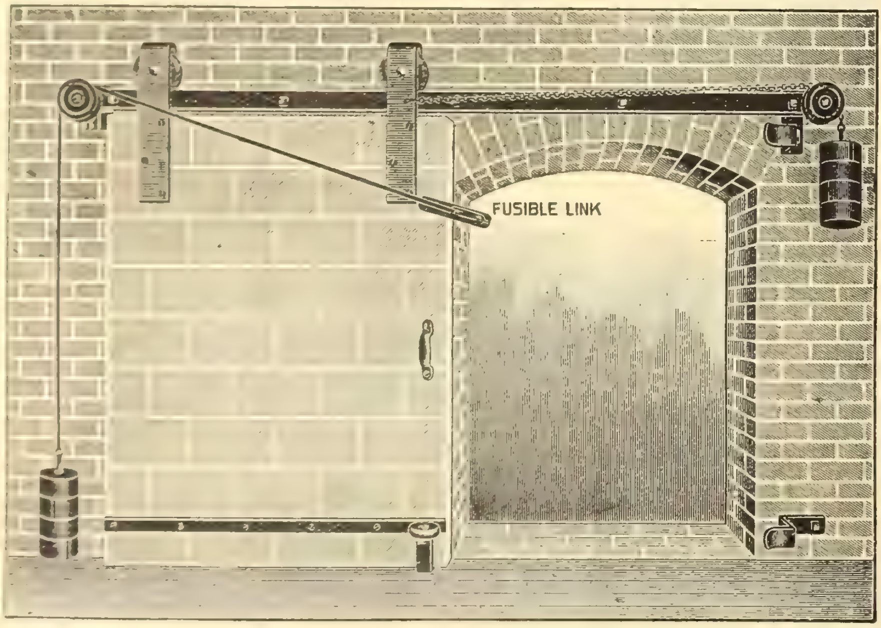

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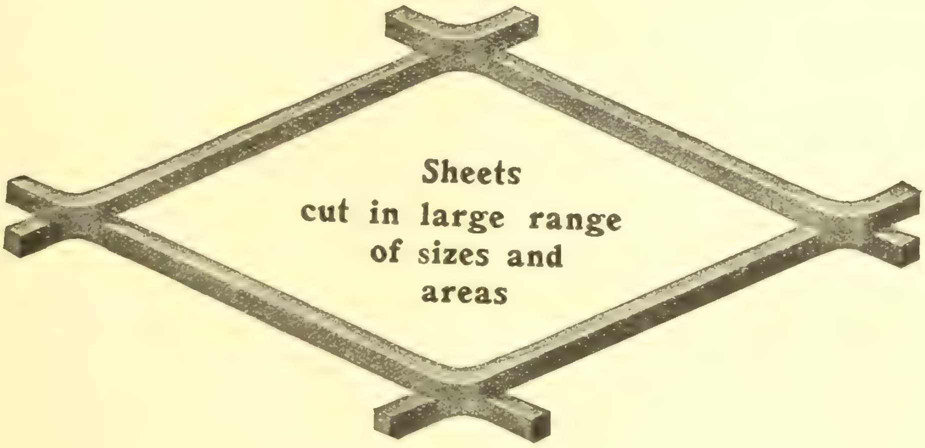

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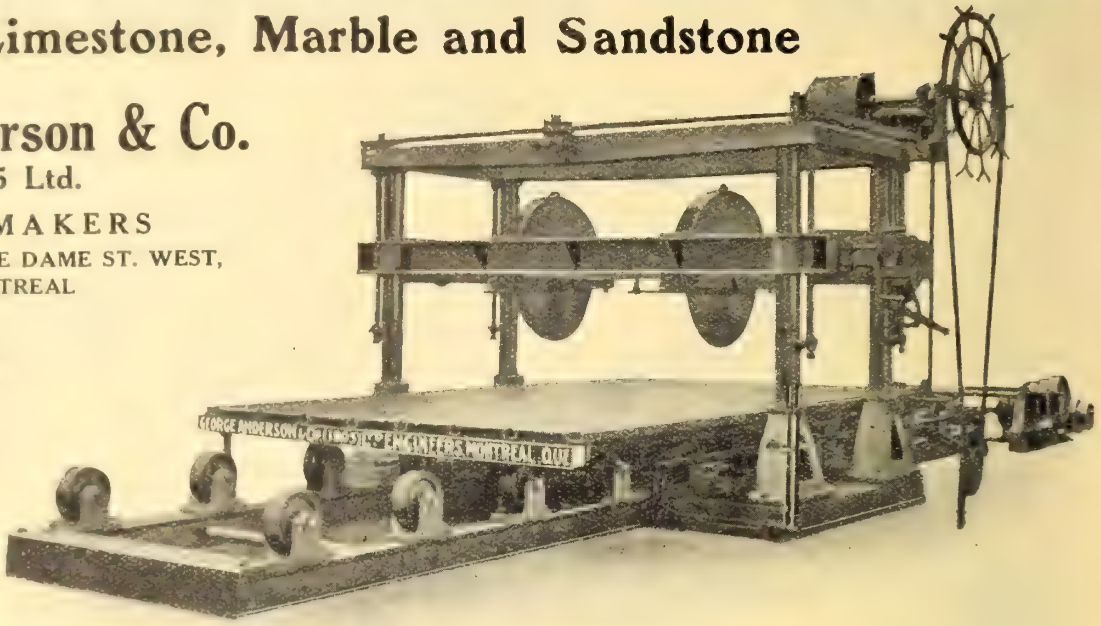

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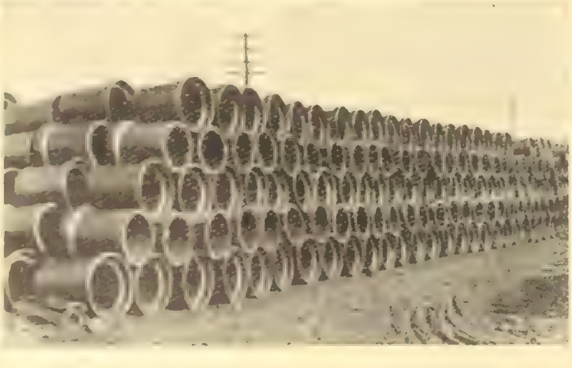

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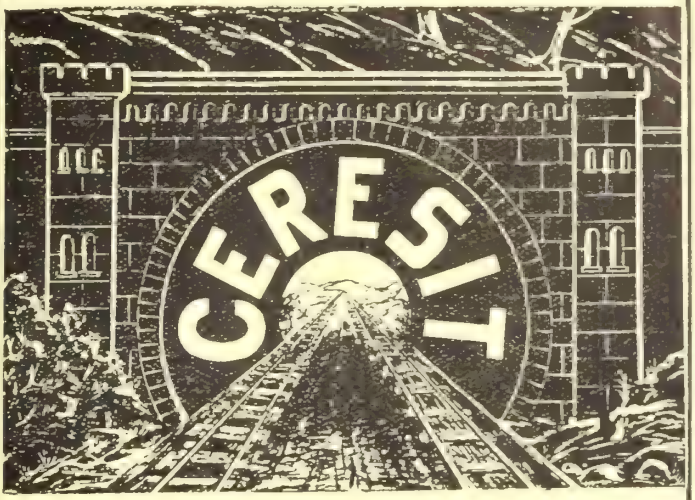

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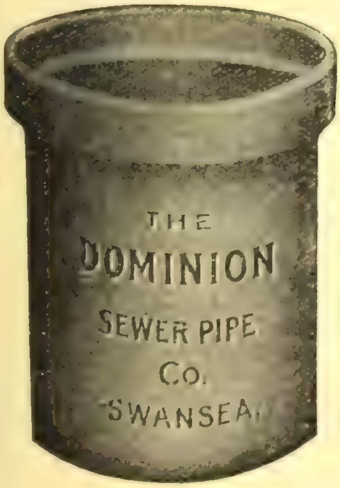

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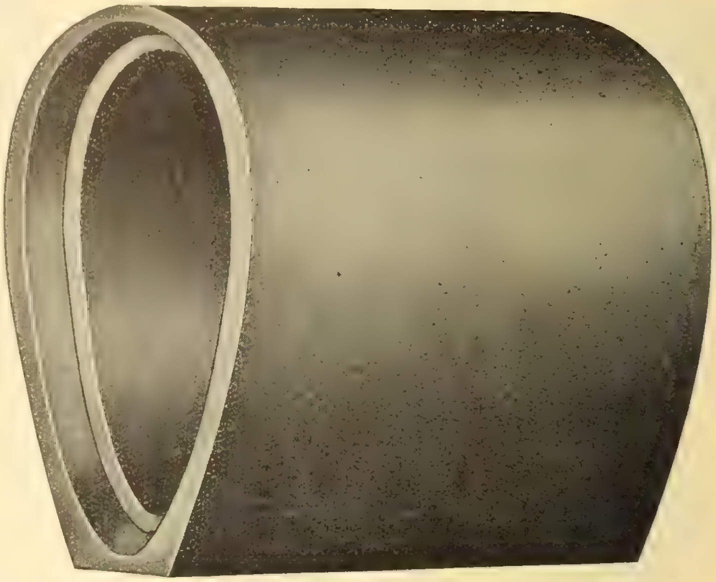
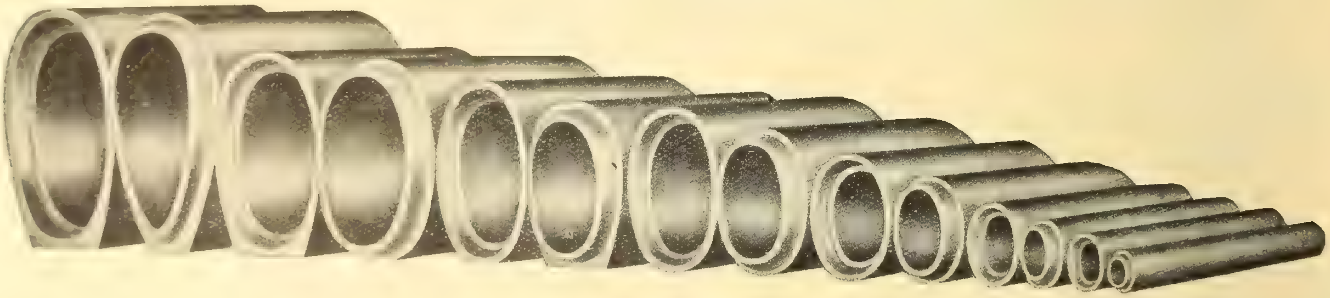
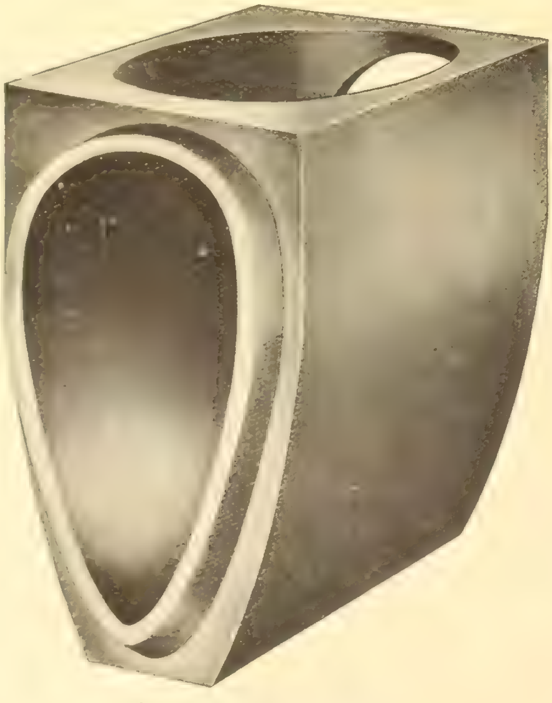


Section of 2' x 3' pipe





Man-hole Section of 2' x 3' pipe

Concrete sewers abound in **England** and **Germany**. The modern **sewers** of **Paris** are all of **concrete**. American cities have adopted it. **Brooklyn** has hundreds of miles of it with not a single failure, whereas even Scotch vitrified pipe has been found to have deplorably failed there. **Toronto,** after much hesitation, is now in line with concrete. Why be the last to join the ranks you eventually will and must join?

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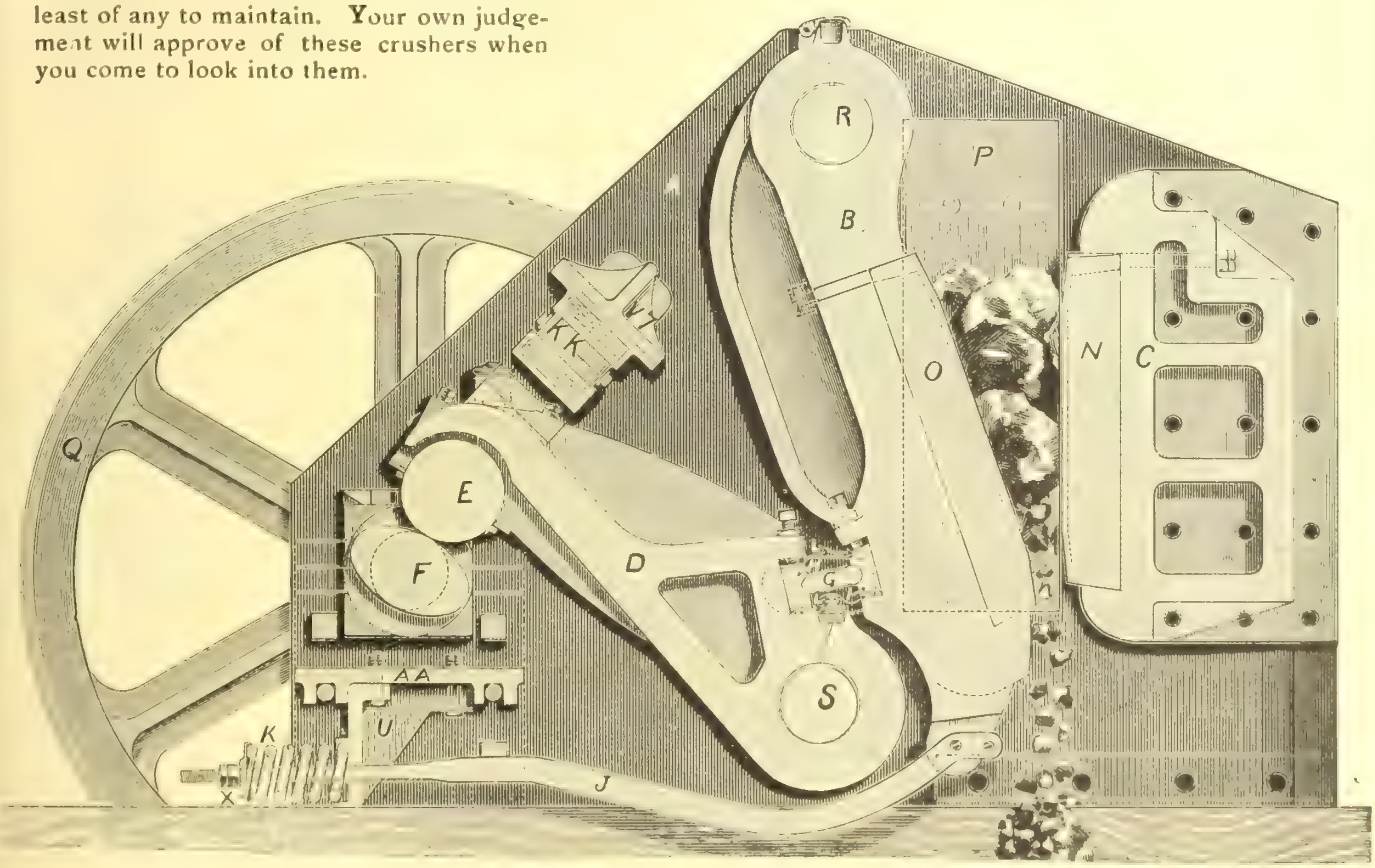

In the diagram you will note the Elliptical Cam is marked F. This is the seat of the action which gives the jaws two motions instead of one. In the diagram A is the main frame, B is the moving jaw, C the stationary jaw, E the anti-friction roller, G the toggle, K J the tension moving spring and spring rod, O moving die, N stationary die.

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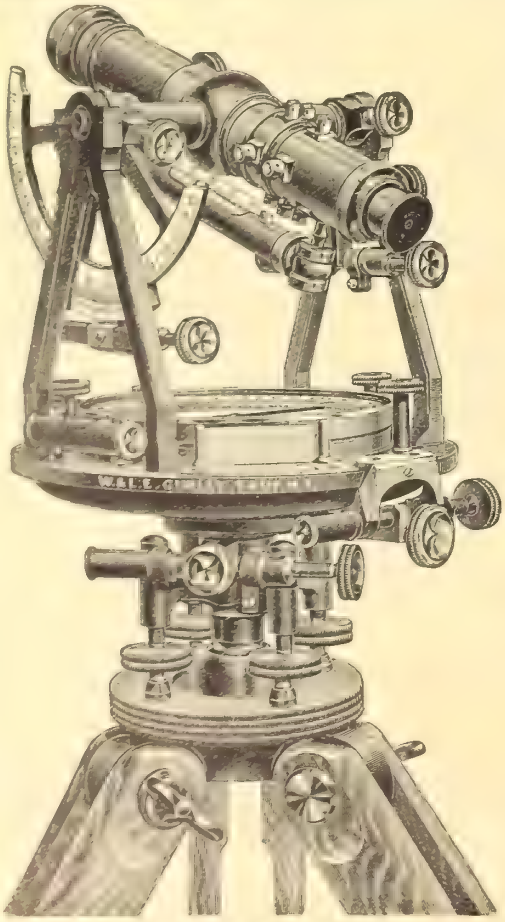

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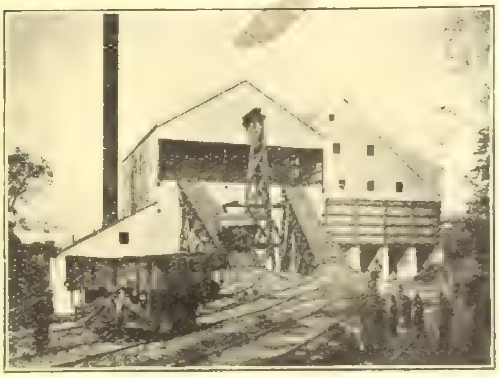

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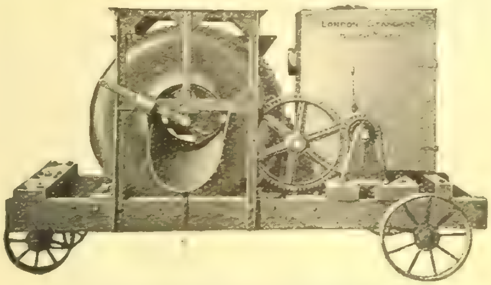

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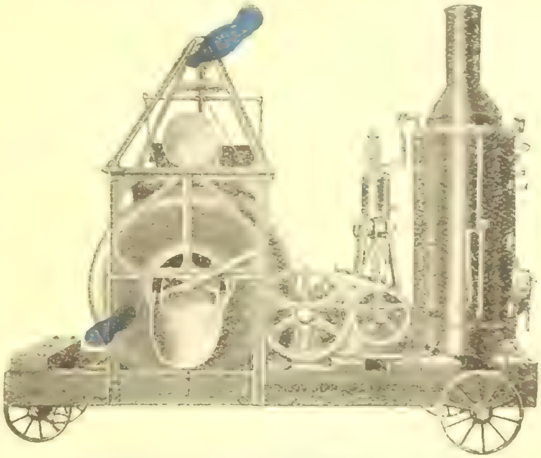

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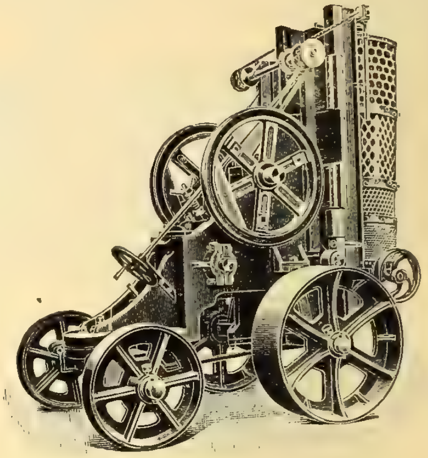

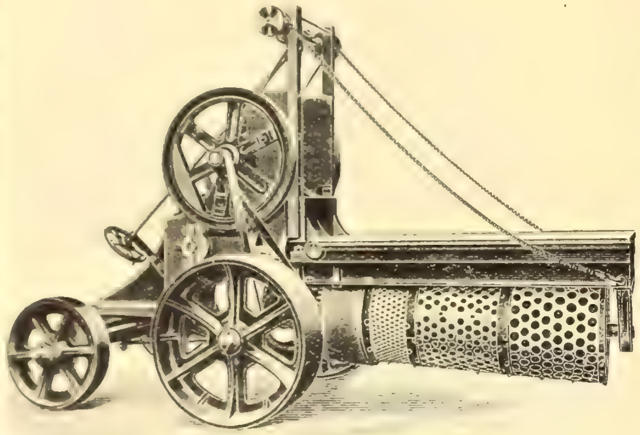

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Vol. 25 March 29, 1911 No. 13

The "Sole Arbitrator" Clause

It has always been an exceedingly difficult matter to prove to municipal engineers the falsity of the position in which they are placed should there by any chance be a vital difference of opinion as to the interpretation of any specification. We do not for a moment say there have not previously been differences, but to fight out such direct differences at law is a costly process. It is our desire to disassociate ourselves completely from any argument of a particular character in relation to one side or the other, that is, we do not wish to take sides, but we do wish to impress upon readers the illogical position which a municipal engineer takes who holds by the "sole arbitrator" clause.

Surely an arbitrator is one having expert knowledge, who shall judge, and judge unbiassedly, between two conflicting opinions. From his very vocation the municipal engineer has a difficulty in putting himself into this position. He is, and must be, a party man. However great his experience, however great his wish to be fair and unbiassed, he is saddled with the responsibility of being in the position that he must do the best he can for his employers—that is, he must err, if he errs at all, on the side of stringency of interpretation in all that counts for authority. And what is his position if the difference of opinion leads to litigation? The procedure can only be on one count—dishonesty. No matter his frame of mind, his effort to do his work in the interest of his employers, whenever that "sole arbitrator" clause is used, legal action must take the course of questioning his honesty. That is not a nice position. His decision is to be "final." It is held to be final unless proved to be dishonest, and, of course, the legal fraternity must so interpret actions and words to support this contention. Now, it may be painful to think it, but nothing is more certain than the fact that no man can go through a trial of this kind unscathed. No matter how really innocent every action and word may have been, there is always a considerable section of the community to take sides and to retain the idea, "there must be something in it." We have long held the opinion that the members of the profession should not put themselves in the position of being so proceeded against.

There may be arguments of some weight for the retention of the clause making the engineer sole arbitrator, but they cannot prevail against the far more weighty considerations that can be put forward for its rejection. It is a most anomalous position to know that the ordinary verbal interpretation of a specification is never intended to hold good. Phrases are inserted because of custom, because of reference in case of dispute. No valid reason can be given for use of such words, "best of its kind." It is well known that there is no intention of insisting upon the strict interpretation of these words—they are to be read "reasonably." Far better to use words that define more clearly what really is required. Surely language is flexible enough to define anything required within small limits, so that there ought to be little chance of dispute as to what the engineer really wants to buy. We are anxious, at the present moment, to restrict our statements, and rather to indicate the necessity for immediate consideration of the question. The two parties—engineer and contractor—labor under disadvantages which can easily be remedied, if so desired.

Victoria, B.C. is mixed up in a nice little complication over the Sooke Lake survey work. The ex-city engineer, Mr. C. H. Topp, was engaged to make the preliminary investigations. Some time after he had received the notification of his appoint and when he actually had a dozen men at work, the mayor vetoed the selection of Mr. Topp. Whereat the ex-city engineer marvelled somewhat, but said nothing and quietly proceeded with the Sooke Lake scheme. It is understood that Mr. Topp has received legal intimation that the first notification of his appointment, received from the city clerk, holds good. The situation is interesting and there is every promise of a legal squabble as to who shall pay the bill for Mr. Topp's services in the event of the mayor refusing to sign the papers authorizing his appointment.

"Like crows in Stanley Park" is the way a Vancouver man described the flocking of paving company representatives to Victoria recently to bid upon the 400,000 square yards of asphalt which the city contemplated putting under contract. No fewer than thirty-eight agents for almost as many companies put in an appearance, and there was grevious disappointment when it was learned that the legislature had refused to permit the present board of works to consider the tenders owing to an informality in the election of the city council. The allotment of tenders will probably be delayed for two or three months.

As Vancouver is now rapidly taking on all the characteristics of a big city, it is only natural that the civic building by-laws are being found sadly inadequate in many cases. The fact has been recognized by the city council in the appointment of a commission of three experts to revise the existing regulations and draft new ones to fit the needs of Greater Vancouver. The commissioners are Mr. Hardy, of Hardy & Henderson, Mr. C. A. Leech and Mr. G. S. Andrews. They begin their labors with one point irrevocably fixed—hereafter all buildings must be subject to the "ten storeys with 120 feet" limit established by by-law

The Reader's Views on Current Topics

Can Engineering and Contracting be Successfully Combined?—The Lowest Tender Discussed—The Cement Show and the C. N. E.

Halifax, N.S., March 15, 1911.

Editor, Contract Record:

I presume that the Mr. W. R. Harris, who contributed an article to your issue of November 2nd., 1910, on "The Training of the Engineer-Contractor," is himself an engineer-contractor, but I should judge, from a perusal of his paper, that he was more of a contractor than an engineer, or rather that he was a contractor mainly, and possibly more or less of an engineer incidentally.

I can imagine, indeed I have known, engineers to have become contractors, but I have never known a contractor who has afterwards become an engineer. If I know the meaning of the word "engineer," a contractor cannot become an engineer. In middle life, or even early manhood—and at an earlier stage of life he would not be a contractor—he cannot enter a scientific or engineering college and go through the three or four years' course by which alone he can acquire the theoretical and scientific knowledge which constitutes the indispensable mental equipment of an engineer.

Mr. C. E. W. Dodwell, Resident Engineer Public Works Department, Halifax, N. S.

Engineer-Contractor "Rarely an Unqualified Success."

The education of an engineer, moreover, would, in a manner, seem to unfit a man for the business of contracting and make it distasteful to him. Ingenuas didicisse fideliter artes emollit mores, et nec sinit esse feros. In short, an engineer-contractor is a hybrid and, like most hybrids, rarely an unqualified success. I do not mean to imply that an engineer is not the better for having some practical knowledge of methods and cost of executing the works of his design, or that the contractor is not the better for some scientific knowledge of the constructive principles, or the properties of the materials, and the stresses to which they are subject, in the work which he undertakes to carry out, but while some practical knowledge of methods and costs is absolutely essential to the engineer in the successful practice of his profession, a knowledge of engineering is by no means a sine qua non with the contractor.

In nearly forty years' experience I have had to do with a great many contractors. Of the successful men in this line of business that I have known, nine out of ten began life with the pick and shovel of the laborer, the trowel and hammer of the mason, or the plane of the carpenter. At the present day, the large-scale, successful contractor employs an engineer, or perhaps a staff of engineers, but the point that I wish to make is that between the mental equipment and essential traits of character of the contractor, on the one hand, and of the engineer on the other, there is a very real gulf, or incompatibility, and that no amount or kind of training will blend or reconcile them.

I can therefore give but a very qualified approval to Mr. Harris' advocacy of the teaching of costs and contractors' methods in our engineering schools and colleges. In the first place, few college professors are capable of such teaching, and their efforts in this direction would, in my opinion, be productive of more harm than good. If a professor were capable of teaching the mathematical and physical sciences and principles of design that constitute the foundation of engineering, and if he also had the requisite knowledge and experience of costs, practical methods, constructive details and the rest, he would himself be a successful engineer or contractor; for the successful engineer or contractor makes three or four times, aye, and fifty times, the salary of a professor. In the second place, the basic scientific principles, mathematical and physical, on which all engineering rests, remain fixed, definite, immovable, while costs and methods, and tools and appliances fluctuate, from time to time, and from place to place, and the engineering student laying up a store of scientific facts and principles in one pigeon-hole of his mind, and a set of prices and methods in another, would in after years find it a matter of extreme difficulty and confusion to discriminate between the fixity of one class of knowledge and the variability of the other, and he would be very apt to throw them both overboard together. Thirdly, the engineering student goes to the engineering college to acquire knowledge that he cannot acquire elsewhere, namely, as I said above, the main scientific principles, mathematical and physical, upon which the whole fabric of engineering rests.

The Function of the College.

But what the engineering professor can do, and should do, is to incidentally call the student's attention to the great importance of costs and methods, or what may be called the "economics of engineering," and urge him to make a profitable use of his holidays, by obtaining employment in even a very humble or unpaid capacity, on some engineering work, with a view to the acquisition of some practical knowledge which, on the resumption of his studies, he can blend and co-ordinate with his theoretical knowledge, to his great and lasting advantage. I have done a bit of lecturing to engineering students in the past twenty years, and I have always made it a point to advise my classes to get all the theoretical and scientific knowledge during their collegiate course that they can absorb and assimilate, because they will never get any after they leave college. It is true that in the past many famous engineers had little or no theoretic training, but they were shining lights in the profession, in spite of, and not because of, their scientific ignorance. And times have changed; the standard of the profession is vastly higher and more exacting than it was forty, twenty, or even ten years ago. The problems that the engineer of to-day is called upon to solve, and the difficulties that he is required to conquer, are far greater and more formidable than they were in the early days of the profession, and to-day, be a man ever so bright, and ever so ambitious or energetic, it is no less difficult for him to reach the highest rungs in the ladder of the noblest of all professions, without a thorough training in science and theory, than it is for a rich man to enter the Kingdom.

Yours truly,
C. E. W. Dodwell.
M. Inst. C.E., M. Can. Soc. C.E.

Canadian Contractors Entitled to Some Preference

Editor, Contract Record:

Referring to the article which appeared in your issue of March 1st, under the heading "The Lowest or Any Other Tender Not Necessarily Accepted," I may say that while I agree with your line of argument in part, I have met cases where I do not think it should apply. I refer particularly to alien contractors who come into the country for the purpose of tendering on some particular piece of work, who have little or no interest in the country, and no intention of locating here permanently. I believe that where competent contractors can be found at home, tenders from foreign contractors should receive about the same consideration as the tenders of Canadian contractors would receive if the positions were reversed.

There are also cases where the lowest tenderer may lack the necessary ability or experience to carry out a difficult piece of work, while at the same time he may be sufficiently strong financially to comply with all the requirements of the tender as to bond, etc., and to lose several thousand dollars, if necessary, in carrying out the contract. But every engineer of experience knows perfectly well what this means in the end; it results in loss of time in completing the work, which may mean thousands of dollars to the proprietor or owner; friction between the engineer in charge and the contractor; legal tangles, and general dissatisfaction.

True, the time of completion can be covered by the bond, but no matter how large a bond you may have it cannot make up for lack of brains or experience on the part of the delinquent contractor. The only recourse is to attempt to recover from the sureties—and this, at best, gives poor satisfaction and usually results in nothing more than an "elongated' solicitor's bill.

No, there are times, I believe, when an engineer or anybody else appointed to consider a set of tenders, should use his judgment, based on his experience, and award the contract to the tenderer who, he believes, is best able to carry out the work—regardless of the difference of a few paltry dollars which may exist between the bids.

However, when tenders are to be considered which are submitted by bona fide contractors doing business in our own country, and all things are equal as to their fitness and ability to carry out the work, then, I say, by all means award the contract to the lowest.

Yours very truly,
Public Works Contractor.

The Lowest Tender

Editor, Contract Record:

We are pleased to see that the above matter, discussed editorially in recent issues of your journal, is receiving the attention which it deserves. Any business concern that has been in the habit of submitting competitive bids will agree, we think, that the phrase "The Lowest Tender Not Necessarily Accepted," has been very much misconstrued. In our patricular expereince we find that in a good many instances tenders are let to the lowest bidder without sufficient regard for such important considerations as quality, time of delivery, etc. This is very often the case in the letting of contracts for buildings. The lowest tender is almost invariably accepted for such work, and, as a result, the proprietor suffers. One great objection to the lowest tender is that an irresponsible contractor, not having the financial means to carry the work through, often secures a contract, and although he may provide the necessary bonds it is a matter of continual vigilance on the part of the proprietor, and also the bondsman, to see if he is going to come out successfully on his contract, without loss either to himself or his backers.

To sum up, we cannot see that this question has been receiving the consideration which it deserves. We think that government officials are the greatest offenders in the abuse of this clause. Partly, it may be, they are placed at a disadvantage for political reasons and do not have the discretion or authority to accept any but the lowest tender. We believe that they award many contracts on the sole merit of the lowest bid—and this for the reason that the general public (also, for political reasons) would not give them the credit should they place a contract based on other than the lowest tender received.

There can only be one correct way, and that is to let contracts the same as a merchant would purchase goods, i.e., with the object of securing the best value for the least money. Particular attention should be paid to the value at all times, for value remains long after price is forgotten.

Yours truly,
A Western Firm.

The Cement Show and the Canadian National Exhibition

Editor, Contract Record:

In connection with the suggestion in your last number, that the Cement Show be held at the same time and form a part of the Toronto Exhibition, it may be worth while to point out some of the difficulties which would be encountered.

In the first place it is doubtful whether the Exhibition authorities would welcome the suggestion that any building industry so highly specialized, and therefore limited in its scope, should have a building of its ment. It is quite conceivable that they would be inundated with similar requests from other industries even better prepared to shoulder the financial burdens involved.

The time of the year at which the Toronto Exhibition is held is at the close of the summer season when practically every contractor is doing his utmost to complete the contracts which he has under way. The Cement Shows have always been held, both here and in the United States, at the opening of the contract season, when the buyer wants to purchase his supplies and the seller wants the opportunity of meeting the buyer. The Canadian Cement & Concrete Association hold the show purely for its educational value, and therefore, to hold it in conjunction with the Toronto Exhibition would be as satisfactory as at the present time, but it is questionable whether it would be possible to secure the co-operation of the firms who could more conveniently exhibit at a season when they were less taken up with the actual filling of orders.

If the Cement Show were held in a special building on the Exhibition grounds, it would be only fitting that this building should be constructed of reinforced concrete and that it should be of such capacity as would hold as many exhibits as the St. Lawrence Arena. Such a building would involve the solution of some interesting engineering and architectural problems. While this could be met from within the membership of the association, the main problem, that of financing the undertaking, could not be met by the members.

Neither the association nor the executive have expressed any opinion as regards this suggestion, although it has been discussed, and the above remarks can only be taken at their face value as an expression of personal opinion.

Yours truly,
W. Snaith,
Sec.-Treas. Can. Cement and Concrete. Assn.

Contract Work at Montreal

Interviewed recently upon the Quebec legislature's new law empowering the city engineer of Montreal to tender on all municipal works, a number of prominent contractors expressed opinions which reflect pretty well the attitude of the trade upon this matter.

Among those who discussed the subject with the "Contract Record" was J. P. Heffernan, of Messrs. Henault & Heffernan, municipal contractors in Quebec and other provinces, a firm which has done as much work in Montreal in recent years as any other concern we know. Mr. Heffernan expressed himself as being in favor of the new law and said that as a citizen as well as a contractor he considered that the city should get its work done as cheaply as possible, and if it could be done more economically by day labor than by contract there could be no valid objection. Concerning the responsibility of the engineer, however, Mr. Heffernan had this to say: "When the city engineer puts in a successful bid he should be held responsible if the work costs more than his estimate put up against contractors. This would put the engineer and contractor on an equal basis. Under exceptional circumstances, where the conditions of the work varied subsequently, as sometimes happens, allowances might be made, but as a general rule the engineer should be held accountable for the excess of the actual cost over his tender. Whether or no he should pay the difference out of his own pocket I am not prepared to say, but certainly the citizens should be protected. In several cases, to my knowledge, work done by day labor has cost from 10 to 40 per cent. more than contratcors' prices offered. The citizens' money paid for the work and nothing was heard of it.

"As to supervision," continued Mr. Heffernan, "the city will probably have more difficulty than contractors in securing competent foremen. Moreover, the contractor employs his men regularly and obtains the maximum efficiency. There is another point, and that is, that the city engineer's work is often scattered all over the city and if he has to supervise it all personally, the results cannot be entirely satisfactory. In any case, however, contractors have nothing to fear from the new law, if Winnipeg and Toronto may be taken as a precedent."

Mr. F. D. Lawrence, who contracts exclusively for municipal work, believes that the new law will minimize the opportunities for the collusion that has been effected in the past. "It is a safeguard for the city's interests," said Mr. Lawrence, "to which no straight contractor can object. At the same time I cannot see how the city will benefit. The corporation is no better equipped than the private contractor. The civic officials must take what workmen they can get, whether competent or incompetent, and pay them union wages. Contractors can pick their men by paying them what they are worth. The city is liable to get the leavings. However, there is not likely to be any opposition to the new law on the part of local contractors."

An interview was also accorded this journal by Mr. J. W. Harris, who has done a considerable amount of work for the city during the past six or eight years. Mr. Harris said: "I am pretty confident that the city will find out before long that day labor is not as economical as contract work. The city has no trained staff to carry out large contracts and this circumstance must militate against expeditious construction. I do not believe the city could undertake such work as the projected filtration plant or the enlargement of the viaduct. And as for street paving and drainage work there is not much in either for contractors. Cement, wages, and machinery have advanced lately and this will make public works more expensive this season. No, I have not heard of any serious objection to the new regulation."

Another prominent contractor said that inasmuch as the city had always estimated on public works and required contractors' bids to come within a reasonable distance of the figure, the new system would not produce any change. As far as his experience with day labor was concerned, however, he had generally found that it had exceeded the estimates.

City Engineer Hay, of Peterborough, Ont., reports to council there that the oiling of the city streets can be accomplished for 25 per cent. less than watering.

Workingmen's houses have been built of reinforced concrete at the new plant of the British Aluminum Company, at Kinlochleven, Scotland. The walls have reinforced concrete columns and beams, and the panels are filled with a wall of two 1½-in. concrete slabs with a 2-in. air space between. The surface is finished by rough-casting. The architect, Mr. A. A. H. Scott, states that the construction has proved entirely satisfactory.

Municipal Work at Nanaimo, B. C.

The annual report of Mr. Allan Waters, city engineer of Nanaimo, B.C., contains a number of items of interest. A separate system of sewerage estimated to cost $300,000, is now under construction. For the first section the city was authorized to borrow $100,000. This section, the contract for which was let to Macdougall & Company, Vancouver, at $48,600, is now nearing completion. It embraces the business portion of the city, four main trunk sewers to residential sections of the city, together with the two main outfalls into the harbor. In this connection the British Columbia Pottery Company, Victoria, B.C., were awarded the contract for the supply of vitrified pipe.

The state of this work at the date of the report is as follows: The main business streets have been sewered, three out of the four main trunk sewers on this contract have practically been completed, an important section of the linking up of the outfall sewer has yet to be constructed, the Comox Road section is well in hand, and the contractor has commenced the construction of a 12-inch iron outfall at that point.

The main outfall of 18 inches diameter iron pipe is being laid on piled bents from shore to main channel of harbor by the city workmen. The arrangements have been made with the Western Fuel Company to fill in with mine refuse the section of pipe from the shore out to near the ferry slip-way. From near slipway out to main channel the pipe will be laid below low water.

The total length of vitrified pipe of various sizes from 6-inch to 18-inch laid is 16,400 feet, or nearly three miles. The grades average 3.0 per cent., excessive grades being avoided as far as possible by ramped manholes. The approximate average depths of trenches outside of business section of city is 6½ feet. Amount of rock, hardpan and cemented gravel excavated, 3,823 cubic yards. Amount of shale, 978 cubic yards. The estimated total cost of the work, including preliminary surveys up to the end of the year, inclusive of pipes, is $566,000.

There are 16 miles of streets within the city limits During 1910 six miles of concrete sidewalks were laid and placed under contract.

The proposals for 1911 embrace further important extensions to the sewerage system as well as a considerable amount of paving work.

Considerable interest is being shown in the tinting of concrete when it is used for residential purposes. Undoubtedly, the work can be done successfully with certain colors. Concrete can be tinted green, for instance, by the use of cronium oxide, in proportions of approximately five to eight per cent. of the weight of the cement used. A yellow or buff tint can be obtained by the use of French ocher in the percentage of four to ten, according to the shade desired. Red is obtained by the use of red oxile of iron, that manufactured in Germany or France preferred. A pure white concrete can be made by the use of one part white Portland cement and two parts marble screening, tough, hard marble preferred, the screenings to pass through a No. 8 screen and be collected on a No. 40 screen. It should be mixed fairly wet so that it will run into the molds. The molds should be slightly rocked and jarred so as to expel the air bubbles. For some characters of work, the concrete can be made not quite so wet, but of about the consistency used by brick masons in laying brick, and pressed in the molds. As soon as the concrete is hard, say in three or four days, it should be rubbed well with a fine terrazzo polishing stone. This will give the appearance of a white polished surface. Although the cement itself will not have been polished, each particle of marble will present a polished surface.

Polychrome Concrete

A large concrete vase, made of what is termed "polychrome concrete," was shown at the recent exhibit of the Architectural League in New York, in order to show the effects that can be produced for garden ornaments, decorative panels, balustrades for bridges and similar purposes. The materials were crushed black and yellow marble screenings all passing a No. 8 screen, ⅛-in. mesh; black and yellow marble chips all passing ½-in and retained on a ¼-in. screen, and Vulcanite Portland cement. Mr. Albert Moyer states that the aggregates were mixed wet and moulded in a plaster mould. As soon as the concrete was hard enough to hold its shape, which took about 48 hours, the inside core was removed. Inspection of the interior indicated that the outer mould could be removed, and as soon as it was taken off, the surface was scoured with a stiff scrubbing brush and water. Where this failed to remove the surface coating a wire brush was used. The concrete was brushed until the larger aggregates all appeared, and in order to obtain texture the brushing was continued until they were thrown slightly in relief. The vase was then cleaned with water and kept damp for a couple of weeks, after which it was washed with a solution of 1 part of dilute muriatic acid to 5 parts of water. The acid was left on for a couple of minutes and then scrubbed off with clear water and a scrubbing brush. The effect as to color, texture and form of such concrete, Mr. Moyer states, is permanent.

High-head high-efficiency impulse wheels were built by Escher Wyss & Co., of Zurich, Switzerland, for a peak-load electric generating station for Milan at Isola, Italy. Each wheel (of four) is rated at 6,500 h.p., and has a single deflecting needle-nozzle. The diameter of the wheel is 108¼ ins. on the pitch circle; the head is 2,800 to 3,000 feet, and the speed of the wheel is 420 r.p.m. The maximum efficiency on test was 88 per cent. At 2,200-h.p. load an efficiency of 80 per cent. is reached, and the curve thence upward is very flat, with a value of about 86 per cent. at 7,200-h.p., i.e., 11 per cent. overload. The plant is described in "Schweizerische Bauzeitung."

Mr. H. D. Anderson, of the Associated Portland Cement Company, is at present at Vancouver in company with Mr. H. K. Bamber, managing director of the English concern, looking over the Canadian cement situation with a view, it is reported, to establishing plants in this country. A similar statement was made a year ago and there would appear to be good grounds for believing that plans have been formulated.

King Hiram of Tyre was another wise man who emulated the sagacity of his contemporary, King Solomon, by using cement to line the reservoir that supplied his capital with water. Hiram's brand, however, was not quite so good as Solomon's. It has cracked and broken off a little more in the course of thirty centuries, but is still "doing business at the same old stand."—Cement World.

Construction Work in Western Canada

Noteworthy Foundation for Winnipeg Building—Features of Interest on the G. T. P. Shops — The Glyn Office Building, Vancouver

Foundation for the Great West Life Building.

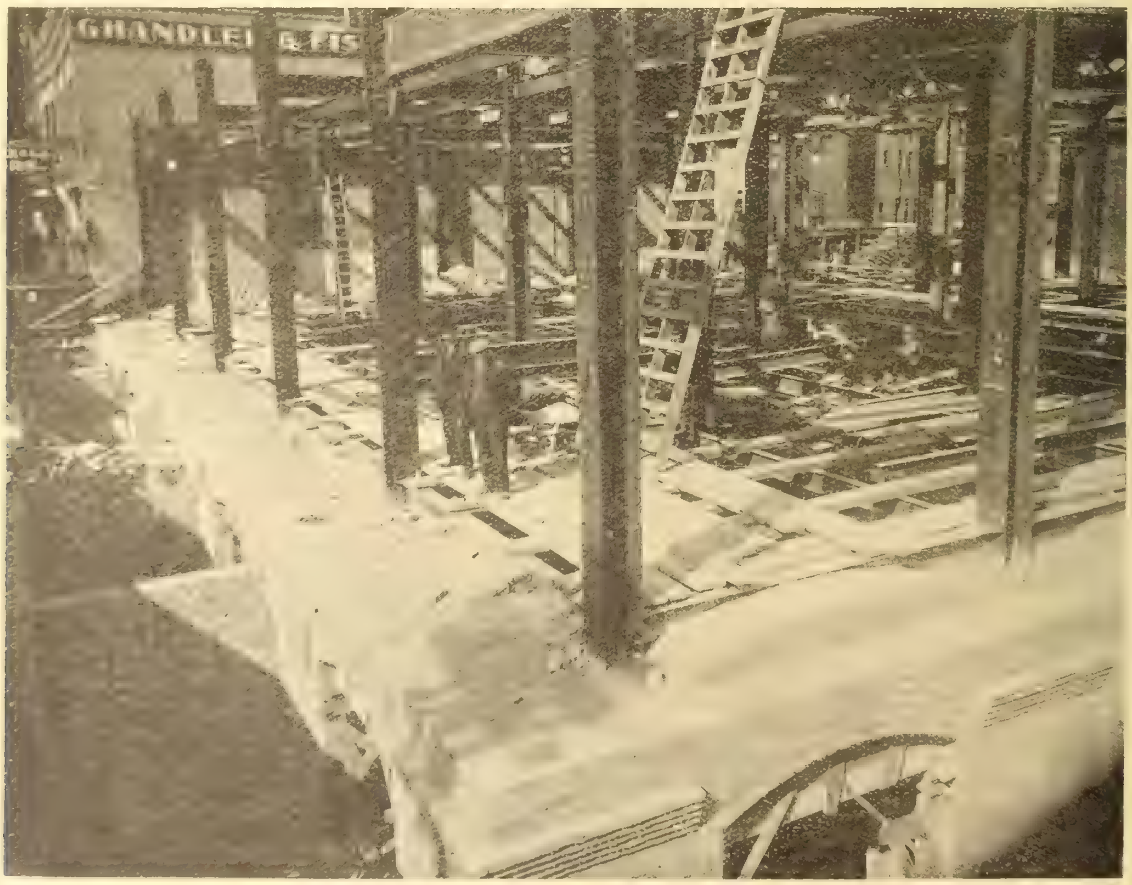
The accompanying illustration shows a section of the foundation of the Great West Life Assurance Building, situated at the corner of Lombard and Rorie streets, opposite the Grain Exchange, Winnipeg. The building has been recently completed and is now ready for occupancy. A remarkable feature in connection with this structure is the immense strength of its foundations, which have been built to carry ten more storeys than have been constructed, or fourteen storeys in all. It is considered the strongest foundation in Winnipeg in connection with a building of this nature.

The foundation is built on the cantilever plan. It reaches twenty feet below the grade level. There are more than two hundred tons of steel used in the underground construction work. The foundation is built on concrete, reinforced with iron rods. The piers are of brick. The outside wall has an average thickness of six feet. It is built of bricks and cement mortared. The columns are of steel and are thirty-four in number. The whole foundation is ponderous and massive in the extreme. Its great strength and carrying power are apparent after even a casual inspection. It is probably a precedent and will mark a new principle to be followed by the builder when planning a structure that will be increased in size in the future.

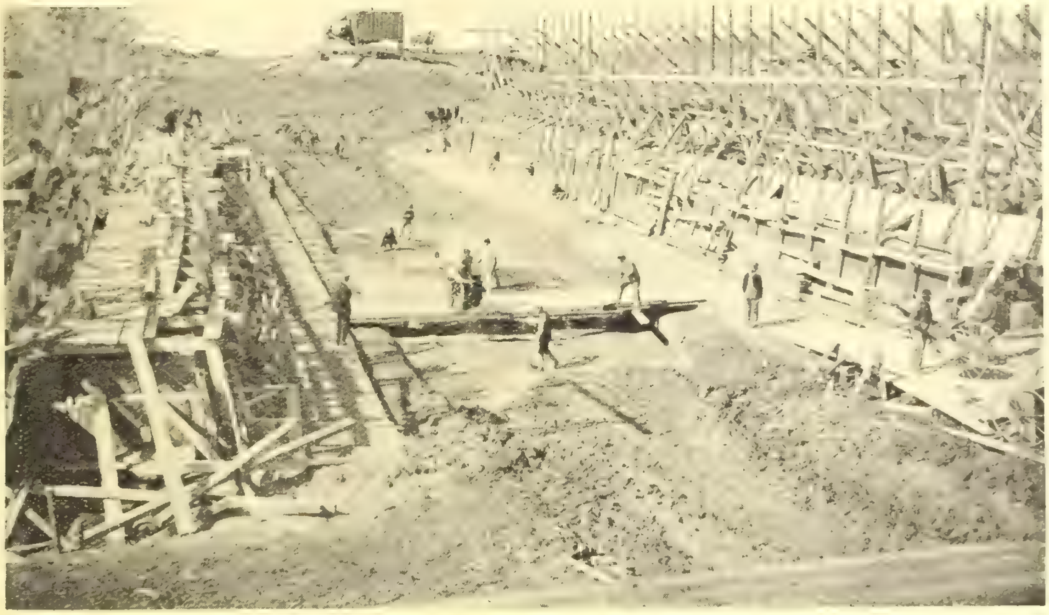
The building is 100 feet square. It is stated that it is of absolute fireproof construction. The most modern ideas have been used in its construction. The general inside finish is of marble and ornamental ironwork. Messrs. C. W. Sharpe & Son are the contractors, and Mr. John Atchison is the architect.

The Largest Stack in the World.

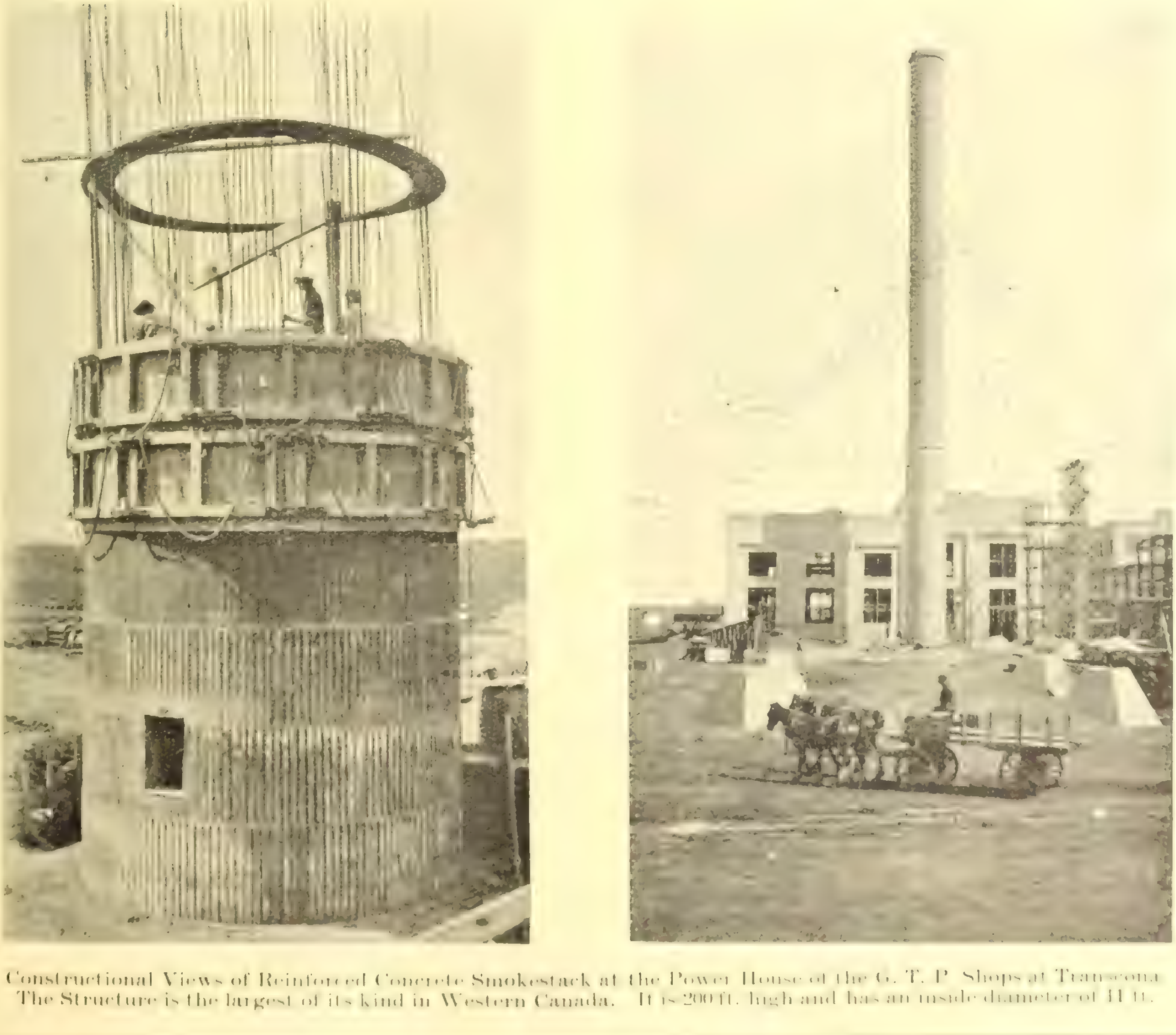
One of the features of the construction of the Grand Trunk Pacific Railway shops at Transcona is the huge smokestack in connection with the power house. This stack, views of which are given on the opposite page, is the largest structure of its kind in Western Canada. It is 200 feet high. The first 66 feet is of double sheel construction, and the remaining 134 feet of single shell. The inside diameter is 11 feet from top to bottom. It is built of reinforced concrete, and stands on a foundation thirty feet square, the excavation for which was carried down to blue clay, where it rests upon 84 piles, each 25 feet in length. This smokestack has sufficient capacity for use in connection with the boilers of the power house, which develop 4,000 h.p. This chimney is a part of



Foundation of the Great West Life Assurance Building, Winnipeg, designed to carry ten extra storeys



Concrete Reservoir in course of construction at the G. T. P. Shops at Transcona. Twenty thousand yards of excavating were involved in the contract. Capacity of Reservoir, 2,000,000 gals.



Constructional Views of Reinforced Concrete Smokestack at the Power House of the G. T. P. Shops at Transcona. The Structure is the largest of its kind in Western Canada. It is 200 ft. high and has an inside diameter of 11 ft.

the contract being carried out by Haney, Quinlan & Robertson. Mr. F. W. Walker, superintendent of construction, made the design.

A Huge Concrete Reservoir.

Another feature of more than ordinary interest, is the concrete reservoir recently constructed in connection with the new shops. This tank is built inside an excavation and has a capacity of 2,000,000 imperial gallons. It is 60 feet wide, 270 feet long, and 25 feet deep. It is divided into two basins, each 30 feet wide. 7,000 yards of concrete were used in its construction. The walls of the reservoir project above the ground for a distance of five feet. The excavation is of 20,000 yards extent. The reservoir is roofed and heated to prevent the forming of ice. It will be filled by means of a six mile pipe line, consisting of a 12-inch wood-stave pipe, and the water will be pumped from the reservoir, as needed, to a high-level tank of 1,000,000 gallons capacity to be used for pressure purposes.

Palatial Office Building for Vancouver.

The illustration herewith is a reproduction of the magnificent new office building to be erected on the corner of Granville and Pender streets, Vancouver, for Jonathan Rogers, one of the city's prominent men. It will be known as the Glyn Building, and will adjoin the handsome Bank of Commerce Building on the corner of Hastings and Granville streets. The block will be ten storeys high and will occupy ground space of 104 x 120 feet. It will contain 350 offices and will have a special ventilating system and the most modern equipment. One wing of the building will be fitted up for doctors and dentists, for whose convenience special electrical and compressed air appliances will be introduced.

The Glyn Office Building, to be erected at Vancouver, B. C.

The building will be of reinforced concrete construction, with semi-glaze cream terra cotta above the first storey, which will be of polished marble. The ground floor of the building will contain eight stores and suitable business quarters to be rented to a well-known Trust Company. The basement will contain a large cafe and kitchen, barber shop, etc., as well as heating and power plants, electric generators, and refrigeration machines for the cafe. The building will be fitted throughout with hardwood and marble. The exposed sides of the building not fronting on the streets will have wire gears and metal frames.

The architect, A. Warren Gould, of the firm of Gould & Champney, and the owner, Jonathan Rogers, are at present visiting Chicago, New York and Toronto, their object being to interview the various manufacturing plans and dealers in high-class finish. The trip will probably include a visit to England, as it is possible they may purchase the terra cotta and special plumbing fixtures abroad.

Construction work on the new block will commence in the early spring, as soon as the necessary drawings can be completed. Mr. Rogers is determined that his new building shall rank as the best office structure on the Pacific Coast.

Tension members in bridges which from bad adjustment or other cause have become bent or slack have been straightened and shortened so as to take their proper share of the stress by means of the thermit process. As described in the "Zentralblatt der Bauverwaltung" the work is done without interrupting traffic. Two clamps are attached to the tie, one above and one below the bend or point where the shortening is to be done, and the clamps connected by two bolts. A two-part mold is placed around the tie, the mold charged and ignited. The tie soon becomes white hot and the bolts are then drawn up to the extent desired. Tests made at the Royal Testing Laboratory at Gross Lichterfelde, it is stated, indicate that the metal is little impaired in strength by the application of the thermit. Some old bridges were first treated, and when the work proved satisfactory the same process was applied to larger structures.

A new form of concrete chimney was originated in 1909 by a Danish concrete construction company in attempting to substitute tapered for cylindrical stacks. The new type is described as the "clover-leaf form." Instead of a circular, or rather annular cross-section, a shape consisting of four arcs, all of the same size, and of a radius less than that of the half dimension of the interior of the stack, is used at the base. This shape may be described as resembling the horizontal periphery of a tomato with four convolutions. The radius of the arcs is the same as that of the top of the stack, so that by gradually taking lagging from the sides of these arcs the diameter of the chimney decreases and the convolutions less marked, merging at the very top to a circular cross-section. This shape was adopted, it is stated in "Beton und Eisen," principally because the form work was believed to be more easily handled than that for a taper chimney of circular cross-section.

The Canadian Northern is planning to have work started in the spring on the construction of the Canadian Northern Ontario Railway east from Port Arthur to overcome the gap in the system in New Ontario of 500 miles between Sudbury and Port Arthur. Location of the line has been completed, and it is intended to conduct the work from both terminals. It will take about three years to complete construction and have the line ready for traffic.

Municipalities and Highway Bridges

Considerations from the Investment Point of View—Availability of Funds—Relative First Cost—Traffic Requirements—Durability—Maintainance*

By C. R. Young, of Barber & Young, Bridge and Structural Engineers, Toronto

The duty of the municipality with respect to its bridges is in effect that of a business corporation which is called upon to provide for the public safe and perpetual facilities for the passage of our streams at a reasonable annual cost to its shareholders, in this case, the public themselves. There should be the same effective management as characterizes a high-class private enterprise, and not only should there be the greatest possible amount of return realized on the money invested in the form of service to the people, but provision should be made for adequately meeting the needs of those who will make use of the highways in the future as well as at the present.

The undertaking on the part of a municipality is one of great importance. Many conditions surround the problem and affect the final decision as to the type of structure and the manner of carrying on the work, and since a bridge costs many times more than an equal length of roadway, and its construction requires a higher degree of skill, and is always attended with more difficulty and a greater element of risk, the necessity of going carefully is evident. With the aim of affording some assistance to municipal councillors and bridge commissioners who have the general direction of the bridge work in their municipalities, the writer proposes to discuss briefly the various conditions affecting the character of the investment of public money in highway bridges. Some typical cases with which the municipal bridge commissioner has frequently to deal will be given special consideration.

Bridge projects generally involve a consideration of the following questions:

1. The availability of funds for the project in hand.
2. The relative first costs of various types of bridges for the situation in mind.
3. Probable future changes in the traffic requirements of the bridge.
4. The relative length of life of various classes of bridges.
5. Relative maintenance charges on various types of bridges.
6. The provision of a structure of pleasing appearance as well as one possessing strength and permanence.

1. Availability of Funds.

The solution of any bridging problem must always be largely determined by the amount of money available for the constructing of the particular bridge in question. In a sparsely settled and undeveloped region where the municipal revenues are small, but where certain bridges are sorely needed, or even in an urban municipality where extensive work must be undertaken and but little money is available, it would be unwise to inconvenience the people and retard the development of the community by deferring the construction of bridges until such time as permanent structures could be built. Sound judgment would demand the erection of a comparatively cheap bridge to last for a limited term of years and then be replaced by more durable structures. An illustration of this is to be found in the case of a certain Canadian city where a long and high viaduct is required for the proper utilization of its railway facilities, but where the great difficulty of financing the scheme can only be overcome by constructing a comparatively light steel bridge with a wooden floor and then rebuilding and strengthening it when the people have come to appreciate the great value of the service rendered and can no longer do without it. The folly of saddling a community with an expense which it is not at present in a position to bear is apparent to all, but it may be said that the opposite mistake of constructing light, cheap bridges where permanent ones could be afforded and would prove a much more profitable investment, is only too common.

2. Relative First Cost.

Naturally the question which looms up largest to the roads and bridges committee in its consideration of a given project is the amount of immediate outlay of funds required—that is, the first cost. Unfortunately this element of the investment is often the only one given any consideration, although in the case of well-to-do municipalities such a short-sighted policy is obviously very poor business. A broad view of the problem would disclose some features of quite as great importance as the initial expenditure.

So many factors enter into the determination of the relative costs of different types of bridges, that it is impossible to state figures which can be used for any other set of conditions than those assumed in preparing such statements. The only safe procedure for a municipality to follow if it wishes to secure reliable information as to the relative costs of different types of bridges for a given crossing is to employ an engineer who is able to thoroughly investigate the particular situation and prepare accurate comparative estimates of cost, taking into account all the local conditions, prices of material, labor, etc. The following observations concerning the relative costs of different types of highway bridges for Central Ontario may prove of interest for comparative purposes and possibly of some value to those who have to do with bridge work in other portions of the province where similar conditions obtain.

So seldom is timber now used for highway bridges constructed that no consideration will be given to its use for entire bridges, but since the question of building bridges with timber floors instead of those with concrete floors is sometimes brought up, a few words with respect to the latter may not be amiss.

Bridges with timber joists and flooring are, of course, only practicable for comparatively light floor loads, such as a heavily-laden wagon or a threshing engine of 7 or 8 tons weight. For 10 and 15-ton road rollers which weigh, when carrying their full supply of fuel and water, about 11½ and 16½ tons respectively, a wooden floor is expensive to construct and maintain since the wooden joists must be placed close enough together to make practically a solid wooden floor from 12 to 15 inches thick. Assuming traffic light enough to warrant the consideration of a bridge with wooden joists and floor plank, the cost of the superstructure (i.e., everything above the abutments and piers) of steel bridges with wooden floors would be from 50 to 60 per cent. of the cost of the superstructures of steel bridges with concrete floors. It should be pointed out, however, that this comparison of cost is not wholly just to the latter type of bridge for the reason that the advantage of its employment does not [illegible] structure would enable it to accommodate a 10-ton or a 15-ton roller whereas the bridge with a wooden floor could be made to carry heavy concentrated loads only at considerable expense. If the substructure, or abutments, were included in this comparison, the total cost of complete steel bridges with wooden floors and concrete abutments would be 70 or 80 per cent. of the cost of similar structures with concrete floors. The great advantage which the lighter structure possesses in first cost therefore largely disappears when the entire bridge is taken into consideration.

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*Presented at Annual Convention of Ontario Good Roads Association, March, 1911

A comparison of the first cost of steel bridges carrying concrete floors and all concrete bridges is of interest, but it should be clearly understood again that these observations do not apply to situations where the local conditions and unit costs are materially different from those in mind in making the comparison. Since concrete is a material possessing a high compressive resistance and of comparatively low cost in most parts of Ontario, it is to be expected that in certain forms of structures where it could be extensively employed to take compressive stresses it might reduce the cost of construction below that holding for steel bridge work.

The structures in which it may, in general, be economically employed are viaduct posts or bents, beam or girder spans and arches. Thus, in the design for the bents of a steel viaduct with the roadway on an average 48 feet above the level of the ground, it was found by the writer's firm that the steel trusses could be supported on concrete bents for 70 per cent. of the cost of steel bents. Short girder spans can frequently be constructed of concrete for 10 or 15 per cent. less than of steel with concrete floors, especially of the deck type, that is where the girders lie wholly underneath the floor. In this case the floor slab performs the double service of transferring the superimposed load to the main girders and of acting as the compression flange for these girders. On account, however, of the fact that the volume of concrete capable of carrying a given load weighs over seven times as much as the volume of steel required to perform the same service, the weight of girder spans becomes very great when they exceed about 50 feet in length and they can no longer be successfully built in competition with steel. The relative costs of steel bridges with concrete floors and concrete arches is to a large extent determined by the character of the foundation materials encountered. If the foundation bed is of soft clay or sand, the special treatment necessary before an arch can safely be built will generally effect any advantage in first cost which the arch might have over a steel span. Assuming that no piling is necessary in either case, however, and also assuming that sufficient rise is available for an arch, the latter form of structure can often be consrtucted at no greater cost than a steel bridge of the same capacity. Where the length of the span much exceeds 100 feet, the advantage in first cost is generally with the steel structure, though it is but small and the bidding may often result in a lower price for the concrete bridge.

3. Altered Traffic Requirements.

The growth of a community and the reaching out of our towns and cities into the country will, because of the increased traffic demands, often seriously overtax our highway bridges unless they have been built for the future as well as for the present. While heavier road rollers than are now in common use may become quite common, the loading to be most feared in the future is the heavily-laden motor truck. These vehicles are particularly trying on the floor system of a bridge because of the large portion of the load which is concentrated on the rear axle, and since motor vehicles weighing when loaded anywhere from 15 to 40 tons will probably be in common use within a few years, it is seen that the investment of the public money in highway bridges should be to a large extent governed by the future probable traffic of the road. A form of structure which is well suited to resist these increased concentrated loadings is the earth-filled concrete or masonry arch. The kind of loading which taxes this form of arch most severely is a uniformly distributed load covering either a portion of the structure or the entire bridge, depending upon the part of the ring under consideration, and the effect of a 10 or 15-ton roller is ordinarily trifling in comparison with that of the uniform load of 100 pounds per square foot generally assumed in the design of arch bridges for country highway traffic. For this reason, most well-constructed spandrel-filled arches, except those under about 40 feet in span can support heavier rollers or trucks than are in common use at the present time.

In addition to the growth in weight of the traffic, there is also the matter of the increased width of roadway and the provision of sidewalks which may be required in the case of bridges in urban localities or those which from the growth of population may became town or city bridges.

4. Length of Life.

The length of life of a bridge may be determined by its destruction by accident or by the gradual deterioration or corrosion of the material and the loss of rigidity due to the wear and the breaking down of the joints. In the case of structures composed wholly or partially of wood the liability always exists of either total or partial destruction by fire. Structures of all types may also be subjected to the pressure and scour of flood waters and the undoubted ability of a bridge to resist such action contributes a valuable element of certainty to the investment. In soft soils the use of piles, although they increase the cost of the structure considerably, constitutes a justifiable insurance against accident, for the majority of cases of bridge failures due to floods have been due to the short-sighted policy of attempting to do without piling where it was unquestionably necessary. An all-concrete bridge, because of its great weight, possesses greater immunity from destruction by floods than a steel structure, and if it be built on proper foundations no harm is at all likely to result from flood waters, since it is able to resist water pressure quite as effectively as a dam of the same height with an opening through it.

The length of life of timber in bridge floors varies greatly with the traffic, being as short as a year or two in the case of city bridges carrying a dense traffic, and as much as seven or eight years for some country highway bridges which are but little travelled and where the floors are in a dry condition most of the time. Probably the average term of life reached by floor planking and wooden joists in highway bridges in this province would be about 5 years.

Since steel bridges have been in general use only 15 or 20 years, the length of life of steel when exposed to the elements is conjectural and must be based on the durability of the older and similar material—wrought iron. A number of fairly old iron bridges are in existence in the province and give evidence of doing duty for some time yet. One of these is the Hunter street bridge, Peterborough, built in 1875, and two others built in 1877 across the Grand river at Paris, Ont. It must be admitted, however, that steel is not as satisfactory a material as wrought iron in resisting corrosion and therefore a shorter life under service is to be expected of it. However, since wrought iron bridges in this country have defied the elements for from 30 to 40 years with no very serious loss of section, it seems probable that steel structures, if given a fair degree of care in maintenance, will be serviceable for a period of 50 years.

Concrete, like steel, is a material which has had only a few years of extensive use in this country in bridge construction, and its length of life is also a matter of conjecture. In other lands, plain concrete has been employed as a material of construction in important works for upwards of 2,000 years. In ancient Rome, concrete bridges and domes built at the beginning of the christian era are still standing, but little impaired by time. Reinforced concrete is a comparatively new form of construction, having found its first employment in France about the middle of the last century. The first bridge constructed in America of reinforced concrete was an arch span erected in Golden Gate Park, San Francisco, in 1889. It has proved eminently satisfactory and many thousands of the same class of structures have followed it. It may be urged that since this structure is located in a less trying climate than ours, its length of life is no guide to the durability of a similar structure in Canada, but on the other hand, we have ample evidence that structures of stone masonry, a material offering greater opportunity of attack for the elements than monolothic concrete, have been in existence for well over a century in this country. It would seem reasonable, therefore, to predict for well-constructed concrete bridges a life of at least a hundred years.

5. Maintenance.

While the annual outlay for maintenance may not in any case be very large, this element is a very important one, for the total expenditure entailed during the lifetime of the bridge may amount to as much as several times the original cost of the bridge.

In steel bridges carrying wooden floors, a large part of the expense of maintenance arises from the necessity of frequent renewal of the floors. On the basis of a life of 5 years and assuming that the cost of providing and laying timber in floors is $35 per M., the annual outlay on this account would be from 2½ to 6 per cent. of the first cost of the superstructure, that is, of the steel work and the original wooden floor. The higher charge is, of course, for short spans and the lower for long spans. If the lifetime of the bridge were 50 years, the expense of renewal of the timber floors for that period would in the average case be nearly 200 per cent. of the original cost of the superstructure, assuming the price of timber were to continue throughout the 50 years the same as at present.

The painting of steel structures constitutes a large item of expense to the municipality, unless the latter is willing to economize in this direction and meet the correspondingly heavy expense of frequent renewals. Climatic conditions and the proximity to towns and cities where corrosive gases may come in contact with the steel, largely determine the durability of preservative coatings. In most cases a steel bridge requires careful painting every three or four years, and if the longer interval is adopted, two coats should be applied, preceded by a thorough brushing and scraping to remove all rust and old paint. On the assumption that steel bridges are painted in this way every four years, the annual cost of painting would be from 2 to 2½ per cent. of the cost of the superstructure for bridges with wooden floors and from 1½ to 2 per cent. of the cost of the superstructure for bridges with concrete floors.

For properly-constructed all-concrete bridges there should be no maintenance charges whatever beyond the gravelling of the roadway over such bridges as carry fills and perhaps the re-caulking of expansion joints at long intervals. These two items combined would constitute but a very small amount of expense per annum, probably not more than half of one per cent of the first cost

6. Appearance.

But little attention is ordinarily paid to the matter of appearances in highway bridge construction. This is to be regretted, for nowhere is there a better opportunity for the expression of good taste and the exhibition of neatness and tidiness in engineering work. A bridge is generally constructed for a long time to come and because of the prominent feature which it forms on the highway, an effort should be made to make each bridge at least a good example of strong, well-proportioned and well-finished construction. It must be remembered also that the traffic over many bridges will have increased many fold before their natural life has expired, and in building some attention should be given to the appearance which the bridge should have when the district may have become much more populous than at present.

Some Typical Cases Considered.

Certain type problems from the investment point of view frequently arise in dealing with bridge projects, and a consideration of a few of these may be of interest in illustrating the general principles already discussed.

A simple problem in bridge economics which requires consideration in fixing the lengths of viaduct is the determination of the points where the earth fill should end and the bridging proper should begin. Under ordinary cost conditions existing in Central Ontario, the first costs per lineal foot of earth fill and of steel highway viaduct coincide for a height of about 20 to 25 feet. This does not mean that the economy of employing earth fill ceases when this depth has been reached, however, for the maintenance charges on an earth fill are limited to re-surfacing, while on a steel viaduct they would be considerable as has already been pointed out. Further, the life of an earth fill is perpetual, but that of any form of built viaduct must be of finite duration and of a steel viaduct probably not over 50 years. The limit of economic depth for an earth fill is therefore not 20 or 25 feet but something greater.

The relative advantages of steel superstructures with wooden floors and with concrete floors are often the subject of much serious study by municipal bridge commissioners. Properly, no fair comparison can be made between them, since the structure with a concrete floor does not find its economical application in the field to which the bridge with the wooden floor must be confined—light country highway traffic. If a steel superstructure with a concrete floor were therefore designed to provide for only the 6 or 8-ton concentrated load which is the maximum loading which a steel bridge with a wooden floor will ordinarily accommodate it would be found that at the end of the natural life of the heavier structure it might have cost as much as the lighter structure with the wooden floor. Such a development would happen, in general, for spans of about 100 feet in length. For shorter spans the lighter bridge would have entailed the greater expenditure in first cost and maintenance at the expiration of 50 years, but for spans over 100 feet the monetary outlay would be greater for the heavy structure. The reason for this somewhat startling fact is that while the cost of renewal of wooden floors in the lighter bridges is very great, the cost of painting the heavier structure is much greater than for the light structure because of the much greater tonnage of steel in the bridge with the concrete floor.

This advantage which the lighter bridge possesses for spans over 100 feet in length is of course only of importance where the bridge will never be required to accommodate rolling loads of greater weight than a heavily-laden wagon or a light traction engine. Should it be necessary to provide for much heavier loads at the outset, the bridge with the wooden floor would lose any advantage which it might possess when employed in its own particular field.

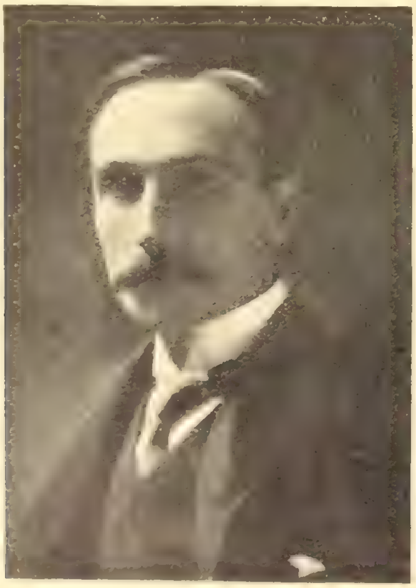
Within the last few years, the economic problem in highway bridge work which has most frequently presented itself for solution is the question whether a steel bridge with a concrete floor or an all-concrete bridge would be the better investment in a given situation. From what has been said already, it is self-evident that where the physical conditions existing at the bridge site will permit of a concrete bridge and where the first cost is at all comparable with that of a steel structure with a concrete floor, the former is the much better investment. Because of the almost negligible maintenance charges and the must greater life of the concrete structure, the annual cost of perpetually providing and maintaining concrete bridges at any typical crossing, assuming a life of 100 years for these structures, is from one-half to one-third as much as it would be if steel bridges were perpetually employed at the same site.

In conclusion it should be repeated that the determination of the relative advantages of different types of bridges from the investment point of view can only be correctly arrived at by the application of sound technical knowledge and clear business perception to a close study of local conditions, and the only one whose qualifications along both these lines entitle him to deal with such a matter is the trained engineer.

Methods of Road and Sidewalk Building

An Interesting Talk on this Subject with City Engineer Fellowes of Westmount — Practical Phases Discussed — Notes on Cost

Mr. F. L. Fellowes, who for the past decade has been the municipal engineer for the city of Westmount, and who has just been appointed executive head of the public works department of Vancouver, recently accorded an interview on road and sidewalk building to a representative of the "Contract Record." While other branches of engineering have been given practical attention by Mr. Fellowes, municipal work has been his specialty and good roads his hobby.



Mr. F. L. Fellowes

"Whenever I have been able to get a few days. holiday," said Mr. Fellowes, "I have taken a trip to some place across the line that has a reputation for good roads and that is employing the latest methods in their construction. In this way I have examined the roads in the making and seen them after completion and testing. Westmount has reaped the benefit and I am leaving behind work that will stand every kind of test and prove that the citizens have got good value for their money."

Speaking first of sidewalk construction, Mr. Fellowes said: "We first lay a good heavy stone base suitable for drainage purposes as well as for carrying a substantial concrete top. We provide outlets for the water in the subsoil by running ordinary farm tile to the nearest gully. We cover the joints with brown building or tar paper and these under drains are laid almost level so that there shall not be too great velocity in the flow. Our concrete is made from crushed stone not too large to pass through a two-inch mesh. I prefer crusher run to screened of the same grade. Clean stone requires more sand and labor for mixing and it is no better than crushed stone so long as the latter has not too much fine dust in it. The old method surface was two parts stone to one part cement and the finished top is one and a quarter to one and a half inches. I find the granolithic top too slippery for this climate. For steeper grades such as we have on the hillsides in Westmount I use a composition consisting of one part coarse sand, one part fine stone and one part cement. This results in a pumice stone surface rough enough to prevent slipping even when the frost is coming out of the stone in the spring. We know this is a good material for we started using it ten years ago and it has been thoroughly tested. We have thirty miles of these sidewalks. Experience has shown me that here we must provide for an 'expansion joint' or 'hair-crack' about every fifteen or twenty feet. I found this out by experimenting. In other climates this feature might vary.

"Our sidewalks on boulevarded streets are built next to the gutter and our surface gutters are made of concrete. This is somewhat unusual but I am convinced that the results justify the method. The advantages are many. The trees, grass and wooden poles or posts are all between the sidewalk and the residences. They are thus protected from damage by horses and other natural enemies that injure them when they are between the sidewalk and the roadway. Then, the water runs from the sidewalk right into the gutter and is carried off to the gullies without damaging the boulevard space as is often done by the reverse method.

Another point in favor of the sidewalk being outside of the boulevard in cities where there is much snow is that it allows a great saving and convenience in the removal of snow. The advantage of the concrete gutter in its relation to the road is that it provides a solid, permanent trough for all refuse from the road after rain or washing. When a macadam, stone black or asphalt road runs all the way across from curb to curb these materials are liable soon to have holes in them. In the case of asphalt and macadam, especially, standing water, uric acid, and other chemical agencies have a tendency to rot the asphalt or soften certain constituents of the macadam on the slope or in the gutter. Besides this climatic changes seriously disturb the surface of roads constructed of these soft materials, whereas the cement gutter maintains its proper alignment and is absolutely permanent. I adopt 24-in. gutters for a 26-foot roadway."

On passing from sidewalks to roadway construction Mr. Fellowes remarked that he made his intersections on street car track allowance of stone block. He favored granite or close grained sandstone of the Medina or Nepian type. These never become greasy, like scoria, and do not "turtle-back." Close joints with a filler of asphalt are waterproof and sanitary. He prefers joints being not over one-quarter or half inch in width.

A good road must have a good foundation, good filling and good top dressing. In fact a good road cannot be made from faulty material badly put together. Taking an example from the Appian way leading to Rome the best English and French roads were constructed with foundations of stone, laid by hand in such a way as to carry the heaviest loads and carry off superfluous moisture. In this country resistance to severe frost had to be provided for also. Stone, asphalt or macadam might be used for the top and all had their values. "I am in favor of asphalt for all level road traffic," said Mr. Fellowes. Supposing the life of a stone paved road is fifteen years and that of an asphalt pavement only ten, I would still be in favor of the asphalt. The first cost of the stone blocks and laying will be about $4.50 to $5.00 per square yard, while the first cost of asphalt will be about $2.00 to $2.50. But when the asphalt is worn out it can be re-surfaced, if the foundation has been properly constructed, for 90c. to $1.00 per square yard, and last another ten years. When you consider the saving to horses' feet and vehicles, the comparative absence of noise, the advantage in cleaning, the sanitary superiority, and other features in favor of asphalt, I think you would say, with me, that granite is not in the race with asphalt, at any rate for residential localities such as Westmount.

"The kind of a foundation to be put into a road will depend largely on the subsoil. Of course, the superstructure also must be considered. Hand-laid stone has been used here with great success and I can recommend it very highly. I put in a heavy base of a total of eighteen inches in depth; composed of a layer of eight-inch stone, hand-laid and well packed; then a layer four inches deep of 'chink' stone, and over that two inches of fine graded stone, 1½-in. grade. Then comes the top dressing. For a twenty-four or twenty-six foot roadway I provide for an eight or ten inch crown, according to grade. The result is that the water runs to the gutter at once without any cutting or wearing or rotting of the asphalt or macadam. Such roads I have found to be in great favor in New York city and state and in Massachusetts, Rhode Island, including their leading cities. They are preferable to the old-fashioned stone macadam as they are waterproof, practically dustless, almost noiseless and the most sanitay, not to say the most economical from the standpoint of easy traction for the haulage of heavy loads. The bituminous surface is, of course, less noisy again than the asphalt.

"The question of easy haulage," said Mr. Fellowes, "was forcibly illustrated in the course of a conversation I had recently with a farmer at Malone, N.Y. We were talking about the proposed interstate and international highway which is supposed to run from New York to Quebec, through Montreal. I had been driven over road fearfully and wonderfully made in an automobile going at the rate of fifty miles an hour for several miles, and when we stopped for rest and breath and to see if any parts of our anatomy were missing I asked him when he expected the road would be improved. 'Right away,' was his answer. 'The government is going to tax us for the work, add fifty per cent to what we pay and then go ahead with the work under competent engineers. The roads will be graded and constructed of semi-permanent material so that instead of drawing a ton load to town with damage to the wagon and injury to the teams, we shall be able to haul two tons with the same team in charge of the same man and with next to no wear on the wagon. Anyone can calculate what a tremendous saving that will mean to us.'"

Speaking of the difference between contract work and day labor, Mr. Fellowes gave it as his opinion that the comparison was in favor of the day labor system. This was, of course, provided that the corporation owned an efficient plant and employed a competent staff and that the engineer in charge was not interfered with in his work or plans by influential aldermen or other persons. Apart from the work being done a little cheaper, Mr. Fellowes pointed out that it would be better done under the supervision of a competent engineer than under inspectors employed by contractors. Inspectors were apt to be inexperienced or lacking in technical knowledge and if underpaid besides temptation might be put in their way that would not ensure the best work being done. Once a permanent job was done the defect could not be seen, perhaps for years, when it would be too late to recover damages from the contractor. A corporation employee who knew that his job depended on his seeing good work done as well as the cost being kept close to the estimate would give better satisfaction to a town or city.

The Niagara River Boulevard*

By J. H. Jackson, C. E.

The name Queen Victoria Park for the most part, I suppose, calls to mind when mentioned the Falls at Niagara and the public domain skirting the gorge and upper rapids some two hundred acres in extent set part for a breathing spot to be enjoyed by the thousands of visitors who annually come from far and near to view the mighty cataract. It is with considerable surprise that the vast majority of tourists both from our own land and across the border learn that the name stands for a system of parks and interconnecting lengths stretching along the Niagara frontier from Lake Erie on the south to Lake Ontario on the north, comprising within its borders over eight hundred acres of land whose extremities are some thirty-five miles apart.

The general arrangement comprises lawns, tree,s shrubbery and a first-class macadam roadway. From the top of the bank fifteen feet is taken up with planting that will not obstruct the continuous view of the river, and, adjoining this, thirty feet is set apart for roadway purposes, while the remaining fifty-five feet will be utilized in lawns, shrubbery and a pathway.

The extent of the work under consideration gives a continuous road from Niagara Falls to the entrance into the Villages of Bridgeburg and Fort Erie, some nineteen miles, and the remaining length in the two villages will likely be provided for by joint action on the part of the Commissioners and the two councils. When the whole of this work is completed a trip may be taken up the Niagara River along the Canadian shore and the return may be made on the New York side on the new State Boulevard now under construction.

The road occupying the thirty feet of width on the river side consists of eighteen feet of macadam construction with six feet on either side for the shoulder and gutter, and it is laid out with tangents and circular curves in a similar manner to railway lines, with curves of large radii to avoid as far as may be abrupt changes of alignment. Complete profiles and sections are obtained and the grades are carefully struck to provide for proper drainage and to balance up cuts and fills. With over five miles in one section almost a level area, it is at once evident that the drainage problem requires much consideration. The typical section adopted shows a road with nine inches of crown in the eighteen feet of stoned surface, and the shoulder of clay in its width of three feet, ten inches to the bottom of the gutter, which has a bottom width of two feet. The remaining two feet on either side forms the outer slope of the two gutters. From the centre of the road to the gutter, therefore, there is a curved slope of nineteen inches. Rather more than would be given were the natural grades not so flat. The depth of stone on the centre line is ten niches, gradually reducing to seven inches at the edges, nine feet away on each side. The subgrade, therefore, has a crown of six inches and the lowest point of the subgrade next to the shoulder will drain to the gutter with three inches of fall. Every effort is made in building to make the macadam not only to shed water but to make it impervious to water. It is believed that the section described will materially assist in this direction. In some stretches of very uncertain material though, side drains of field tile leading the catch basins may be laid.

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*Read before the Ontario Good Roads Association, Mar [illegible]

Constructional Procedure.

The first work by the contractor after the right of way has been cleared of fences, trees and buildings, is to commence the drainage system for carrying the waters from the gutters to the river. This consists of outlet drains from the water's edge across the road itself and extending to the landward limit of the Esplanade lands. These cross drains or outlets are spaced from five hundred to eight hundred feet apart, as the natural slope of the adjoining land and the gutter requirements call for, and the water enters the outlet by three catch basins, one in either gutter, and one at the end opposite the river side. The size of pipe used varies with the location, but ordinarily is twelve inches in diameter and of concrete laid to a minimum grade of 0.5 per cent. The discharge end is protected by a hand-laid dry masonry headwall and apron. This structure is bedded under the last two pipes twelve inches deep for three feet and the apron extends to and below the normal water level in the river. It is carried two feet above the top of the pipe and two feet on either side. This heavy block of dry wall is designed to precent under cutting and washing of its river slope in time of heavy freshet. The catch basin itself is not built until the gutters are excavated and the shoulder shaped when it is placed with its top at the grade of the gutter at the point of its location. It consists of a fifteen-inch concrete tile and the junction with the twelve-inch discharge is made with a block of concrete two feet two inches long and bedded four inches below the bottom. No sump is left in the catch basin for the length of pipe is short and it is preferred that any sediment should be discharged into the river. The opening of the catch basin is protected by a circular cast iron top designed to fit the pipe with a collar one and three-eighth inches in depth.

When the drainage outlets are well in advance, excavation for the subgrade is proceeded with according to the levels staked upon the ground by the field men in charge, along with the inspector of a working section of the road. This work varies greatly, requiring much labor in the heavy clay, and progressing rapidly in the sandy loam. The trimming to the required section is done by an ordinary road grader and from one to two inches is left to be consolidated by the heavy road roller (twelve to fifteen tons) which is now placed to work. With the eighteen feet to the proper elevation and section and the side gutters roughly excavated to the top of the macadam surface and foundation stone is started. This is a layer of heavy unquarried irregular stone five inches in depth at the centre and four inches at the shoulder. It is hand-laid with projection points and edges knocked off with the hammer to fill the crevices. With the harder class of stone in the vicinity this course must be filled with screenings before rolling commences, but when the base course is of medium soft stone the roller is placed to work without filling and enough of the projections are worn off to fill the interstices. This layer is thoroughly compacted and rolled to its required camber and then follows a layer of three to two-inch stone, three inches deep at the centre and two inches deep at the shoulder. This middle course is filled but lightly with screenings and watered and rolled when the top course of one-inch stone is added and rolled into the honeycombed top of three to two-inch stone. This top layer is two inches deep at the centre of the road and one inch at the shoulders.' Rolling now continues till the whole is completely compacted, and the roadway shows an acceptible surface for traffic. The work now remaining is the shaping of the shoulder and gutter with the placing of the catch basins. The clay shoulder must be rolled to its required section to show a continuous crown between side ditches.

The stone of the Niagara district, for the most part limestone, varies considerably, and a close inspection has to be maintained to ensure a hard, tough quality of metal, particularly for the top courses. Some of the material offered crushes under the roller until there is practically nothing but screenings for wearing surface. But by careful selection and strict enforcement of the requirements a very fair quality of stone is being procured. In addition to the road drainage all of the water courses and larger ditches are taken care of by either single or double box culverts of reinforced concrete and bridges of artistic design. The streams of any considerable size emptying into the Niagara River between Chippawa and Bridgeburg, and requiring to be spanned by bridges, and are six in number. These structures will all be of the arch type, built of concrete, reinforced with steel and veneered with limestone or sandstone except on one span where concrete is used in massive form. The bridges vary from thirty feet to seventy-five feet in span and each one is individual in its architectural features.

System of Maintenance.

From the beginning of construction work, the problem of maintenance has been kept prominently in the foreground and the section of roadway already completed has been under constant inspection to learn the effect of the traffic and note the efficiency of the drainage. In addition to the studying of conditions a series of experiments are being conducted by the engineering department with dust-laying preparations and surface binders to determine the cost and effect of the products that are being offered to keep the top course from ravelling. It too often happens that the main construction is given much intense consideration and its details are worked out with so much thought that the matter of operating the system receives but scant attention and yet the success of the road, like any other work, depends upon whether it will perform its function as it is designed to do and resist the obstacles in its pathway. Only recently it was publicly stated that on one of the large road systems the construction laid at the first of the season was failing before the contractors laid off for the winter. Several binders have given evidence of their value in the roadways in the park and the cost has not been excessive, but the same product gives different results under different conditions, and a proper selection must be made for the roadway to be treated.

We are in receipt of an informative booklet on Friction Clutch Mechanism from the Dodge Manufacturing Company, Limited, Toronto. Friction clutches during the last few years have materially reduced the percentage of factory accidents attributable to revolving shafting and its equipment, while the friction clutch has unassailable claims from an economical standpoint. By the use of friction clutch pulleys and cut-off couplings it is possible to divide the shafting equipment in a mill or factory into units and to run only that machinery which is actually required. The Dodge Manufacturing Company have had an excellent line of clutches on the market for over eighteen years. They have patterns for a complete range in all sizes from the smallest to the largest and in capacities as small as 1 horse power and as large as 1,000 horse power.

Possibilities of the St. Lawrence River

Equal and Perhaps Superior to the Georgian Bay Route Report should be Submitted before Adoption of any Competitive Scheme

Before the General Section of the Canadian Society of Civil Engineers on Thursday, March 16th, Mr. Henry Holgate, of Montreal, presented a valuable paper, entitled, "The Upper St. Lawrence River; Its International History, Development of Navigation and Future Possibilities."

After giving a resume of the international legislation into which the river has entered since the Treaty of Paris in 1763, Mr. Holgate discussed the physical features and its history as regards navigation. The first lock canals in Canada were built on the St. Lawrence by the Royal Engineers in 1783. Preparations for the Lachine canal were made in 1815 and the work was completed in 1825. The Cornwall canal was commenced in 1834. Owing to the rebellion its completion was delayed until 1843. The Beauharnois was enlarged about this time and opened in 1848.

Mr. Holgate gave further interesting particulars, and concluded this section of his address by stating that the total amount expended in connection with the St. Lawrence canals up to the end of the last fiscal year was $52,676,298. Concerning the relative advantages of the St. Lawrence river and the Georgian Bay canal, Mr. Holgate said:

Various large schemes of inland transportation by water are now being considered, as for instance the Georgian Bay Canal, and the enlargement of the Welland Canal. In the case of the former, the terminus will be the Port of Montreal, and with the enlargement of the Welland Canal, the larger lake vessels will be able to reach Prescott where the cargoes will be trans-shipped, and moved eastward by rail, or by smaller vessels through the canals to Montreal.

Trade must follow the line of least resistance, and it is a question which has not yet been answered in a satisfactory way, will not the enlargement of the canal system on the St. Lawrence to the Port of Montreal, or a scheme of dams and locks with an improved river channel, be justifiable in the economic working out of our transportation problems, so that upper lake vessels may bring their cargoes to Montreal.

The route via the proposed Georgian Bay Canal will be 282 miles shorter than the existing water route, but the element of time must be considered, and the following is an extract from the report on the Georgian Bay Canal scheme, as submitted by the government:

"Time of transit is affected by the length of restricted channels on the route, where speed has to be reduced, and by the number of lockages, and consequent delays. A close computation of the speed allowable in the different stretches, with about three-quarters of an hour delay for passage of each lock, gives about 70 hours, as time of transit from Georgian Bay to Montreal.

"With the advantage of shorter distances between terminal harbors, it is computed that the route will be from 1 to 1½ days faster than any other existing water route, under present conditions, from the head of the Great Lakes to an open ocean port, apart from also having an enormous superiority as to carrying capacity. But as compared with a possible improved system of St. Lawrence canals to a depth of 22 feet, assuming that the number of locks would be greatly reduced, and some of the channels widened, probably no practical benefit in time of transit could be claimed, the saving in distance being nearly offset by the longer stretches of lake and wide river navigation which exist through the Lake Erie and Lake Ontario route, where higher speeds would be permissible."

So that in so far as time is concerned, an improved St. Lawrence route would be equal and, perhaps, superior to the Georgian Bay or Ottawa River route. For many years the improvement of the St. Lawrence canal system has been discussed, but not in such a way as to permit definite conclusions. No comprehensive surveys and estimates have been made so as to determine the practicability of increasing the capacity of this route to Montreal on such a scale as contemplated for the Georgian Bay Canal, with locks 650 feet long, 75 feet wide, and a minimum of 22 feet of water on the sill, or of greater dimensions.

The dimensions of the canal and locks is a question demanding careful enquiry and foresight. There are boats on the lakes now 605 feet long, and the proposed new United States lock at Sault Ste. Marie will have 24 ft. 6 in. of water on the sill.

I think the time has come when such a study of the St. Lawrence should be made, and this, before we should commit ourselves to heavy expenditures on competitive routes.

The idea of canalizing the river by maintaining the navigation channel in the river and erecting dams below the various rapids, locking at each dam, has been the dream of engineers for many years, and this has of late been prominently brought forward by the proposal of a power company to treat the Long Sault Rapids in this way.

By treating the river in this way speed will be greatly increased, the number of locks might be reduced from 21 to 6, and the long stretches of river will be made use of to great advantage.

Primarily any such work, as erecting dams across the river, must be for the improvement of navigation, and Canada is more interested in the improvement of navigation, of the St. Lawrence than is the United States, and Canadian interests in this matter focus in Montreal.

The development of power can only be held to be incidental, the real motive must be the improvement of navigation.

Mr. John Kennedy, our best authority on such matters, and whose judgment I would not question, has concluded that works such as are proposed at the Long Sault can be wisely and safely built and maintained, and I think that the same may be said of similar works if constructed at the other rapids.

In the report of the United States Deep Waterways Commission of 1900, it is shown that a deep channel may be obtained from Lake Ontario as far as the head of the Long Sault Rapids, which was as far as that investigation dealt with the St. Lawrence River.

I am not now stating that this is the best way of improving navigation so as to create the greatest benefit. The question is a very great one, and of vast importance, and we have not the evidence before us to form a correct opinion. The question is a national one, and I think that it should be carefully studied, so that the future policy of inland navigation may be carried out on more definite lines than the present knowledge warrants.

If Canada is to incur a very large expenditure on the improvement of inland transportation by water it would be business-like to make the expenditure in the direction from which the greatest benefit would result—so as to obtain the greatest efficiency, and first of all to ascertain all facts which would lead to a correct decision.

The work of improving canal transportation must be a national work, and all canals must be owned and operated by the Federal Government; no private ownership or exploitation of national waterways would be practicable in this country, and may be looked upon as impossible.

The development of power, though an important thing in itself, must under the terms of the treaty of 1909, in the case of the St. Lawrence River, be considered as secondary to the improvement of navigation. No development of power is desired unless by so doing we improve the conditions of navigation, and obtain from such development commercial equivalent for the power produced.

The question before us now is not the maintenance of present conditions of navigation, but how can these conditions be improved, and they must be improved if we are to secure to the Port of Montreal what nature has given us.

The minimum amount of power that may be developed on the St. Lawrence River between Lake Ontario and Montreal, is the [illegible] The absorbtion of this amount of power will be very gradual. It is not now commercially possible to utilize this amount of [illegible] but we do not know what the future demands will be. Is it not common-sense to think about this, and to provide for the future as broadly as we can? What I would urge is that a careful study of this whole subject be made now, so that a definite policy may be adopted in order to get the greatest efficiency out of what nature has given us. This study devolves primarily upon the government of Canada, and I would urge that such a study of the river's possibilities should be made, and a comprehensive report be submitted before any commitments be made by Canada for the damming of the St. Lawrence River at any points on it, or the carrying out of any other great scheme of canal transportation.

Let us first decide by logical deduction from definite data what scheme is better than the other, and then carry out that scheme in the most efficient way possible.

In the ensuing discussion Mr. John Kennedy expressed strong disapproval of what he considered was a deliberate attempt by private interests to coerce the government into the construction of the Georgian Bay Canal.

About one hundred members were present. It was generally conceded that the St. Lawrence route should be studied and that full information concerning its advantages should be obtained before the government comitted itself to the construction of the Georgian Bay Canal. Subsequently the following resolution, presented by Professor Herdt, of McGill University, and seconded by Mr. Kennedy, was passed:

"That the Council of the Canadian Society of Civil Engineers be requested to take up and study the suggestions made that the Dominion Government be urged to make a study of the River St. Lawrence and its possibilities, and that a comprehensive report be submitted before any commitement be made by the government for the damming of the St. Lawrence at any point, or the carrying out of any other great scheme of canal transportation, and that the council be requested to take this matter up, and if advisable to make a report to the Dominion government."

Modern Filtration Plant for the Montreal Water & Power Company

The Montreal Water and Power Company is a private corporation that supplies water for domestic purposes and fire protection to the municipalities surrounding the city of Montreal and several wards that were formerly separate and independent municipalities, but which have within a few years past been annexed as wards of the city. The territory served by the company includes the greater portion of Westmount, Mount Royal ward and Outremont; all of Laurier ward, St. Denis; Delorimer, Villeray, Cote des Neiges Wards and much of Maisonneuve.

The company has under construction a large and up-to-date filtration plant for which considerable excavation work has already been done. This is a rapid-gravity, sand filtration system with an initial capacity of 25,000,000 gallons per day, provision being made for extending it to 50,000,000 gallons. The clear water basin and filter bed will be of reinforced concrete construction. The operating floors, laboratories, machinery room, air and wash-water plant will be housed in brick buildings with slate roofs, thoroughly fireproof and modern in every detail. Similar plants may be seen at Columbus, O., Little Falls, N.Y., Newport, R.I., Harrisburg, Pa., and elsewhere.

The plant will be situated just north of the company's pumping station on the north shore of the St. Lawrence, opposite the Nun's Island, and near the boundary line between Montreal and Verdun.

The water is first led through the new five-foot steel intake pipe to the new steel-concrete well from which it will be raised by the 25,000,000 gallon low lift pumping plant to the top of the filter so as to flood the sand filtering area. The water flows by gravity throught he sand beds into collecting drains and thence to the clear water basin. From here it passes, under pressure, to the high pressure pumps and is forced by them through the maws.

The plant was designed by Mr. F. H. Pitcher, chief engineer and general manager of the company, and is being installed by the Continental Jewel Filtration Company, of New York. The buildings including concrete and excavation, are being constructed by Messrs. Laurin & Leitch, of Montreal.

The guaranteed bacteriological efficiency of the plant will be 98 per cent. This, in conjunction with the sterilizing plant now in operation and which this company was one of the first on the continent to install, will furnish a clear, colorless water of unusual excellence. For some time past the Provincial Board of Health has been making bacteriological tests of the water furnished by this company. These tests show that there has been no pollution in the water since the installation of the sterilization plant during a long period covered by reports now in the company's office. Tests are made five or six times each month in the interest of the public and quite independent of the company.

Mr. Pitcher says that if the company had not been committed to the filtration system for Westmount before the discovery of the treatment of water by hypochlorite of lime he would not have recommended the filtration plant as a means of purifying the water bacteriologically. The lime treatment costs but a small fraction of the filtration system, while the results are not only as certain, but, in many instances more efficient. The amount of commercial chloride of lime used is about twelve pounds to a million gallons of water or one part of hypochlorite to a million of water. In many cases one part to two million would be sufficient.

The plant is to be in operation in the spring of 1912. The estimated cost is $425,000.

Lake-water for St. Andrew's by the Sea

St, Andrew's-by-the-Sea is a famous summer resort, but there has always been one thing to detract from its popularity, and that was the poor water supply which was derived from wells. The Canadian Pacific Railway, being interested in the place as a resort, decided to bring about an improvement in this direction and employed Mr. H. D. Lumsden, C.E., to lay out a waterworks system that would be satisfactory. Mr. Lumsden found that water in unlimited quantity could be had at Shamcook lake, about five miles from St. Andrew's, and that it could be conveyed to the town by a gravity system. Work was accordingly commenced last fall and has been in progress throughout the winter with the result that the plant is expected to be in running order by the first of May. The reservoir, which has been constructed on the highest level near the town, is built of concrete on solid rock. It will have a capacity of half a million gallons and the head is sufficient to furnish a pressure of 125 pounds in the hotels and stores and houses in the town. The water is pumped into the reservoir by a 9 by 12 Gould triple pump, the power being furnished by a Foos 50 h.p. gasoline engine. The pump has a capacity of 400 gallons per minute. The mechanical installation is in the hands of Mr. William Perry, consulting and hydraulic engineer, of Montreal.

The Marine Department of the Dominion government has arranged for the erection of a number of new lighthouses along the dangerous west coast of Vancouver Island. They will be of reinforced concrete, absolutely fireproof, and will be surmounted by the most powerful lanterns on the Pacific coast. The first of the number will be erected at Cape Cook.

Messrs. McGregor and Black, contractors, of Regina, have dissolved partnership. Each is continuing business on his own account.

Marine Depot at Prince Rupert

The Pacific Coast Construction Company, of Victoria, has been awarded the contract for the new depot to be established by the Marine and Fisheries Department at Casey Cove, about three miles from Prince Rupert. It will consist of a reinforced concrete wharf 405 feet long and 50 feet wide, with a long approach. Eight frame buildings, including a buoy warehouse, power house, offices and residences, and a coal bunker to be erected on the end of the wharf. The contract price is about $200,000, and the work is to be completed by the end of the year.

The wharf piles will be made entirely of concrete and steel, designed to give the greatest strength with the smallest diameter, and the ravages of the teredo which makes the life of wooden piles short, cannot harm this pile.

They are composed of steel longitudinal rods, a lattice work of heavy guage wires, a steel shoe and a driving head, the whole arranged so as to form a steel pile enclosed with concrete. The rods run longitudinally from one end of the pile to the other, close to the four corners, and are wired together every few inches from end to end with heavy guage wire. The wiring is so arranged that the four sides of the pile resemble a continuous steel plate from end to end and from side to side. The shoe is made with straps welded into the extreme point when the casting is in the liquid. The piles are manufactured on the site in wooden moulds, the steel frame work being lifted bodily into the box and filled with close concrete. When set the moulds are removed and the pile is then handled by the ordinary pile driver. A wooden cap is used in driving and the driving head is so arranged as to take all the concussion. No amount of hammering can injure the pile in the slightest degree. They are made square in any length up to 100 feet, measuring 15 in. x 15 in. to 17 in. x 17 in. in diameter, according to length. Each pile is designed to carry a load of 250 tons. The old method of making a concrete column was to sink a steel core through the mud, pump out the silt and fill with concrete. By this method a certain amount of silt always gets into the concrete, and between the concrete and the rock bottom. This method is costly and often unsatisfactory. With the Stedman concrete pile the whole construction can be supervised and tested before the pile is driven.

Soap Concrete Successfully Used

Soap-water instead of ordinary water, has successfully been used for the purpose of making reinforced concrete water-tight. The case is reported in Beton und Eisen, and concerns a grain-elevator built on the Danube, exposed to inundation. The concrete was provided with two coatings, also of concrete. The outer coating, 3½ inches in thickness, consists of fine-grained concrete containing 400kg. of cement and 120 litres of water per cubic metre of mass, and the inner layer, ½ inch in thickness, consists of cement mortar prepared with fine river sand. The water is replaced by a solution of common soft soap (potash soap), about 4 kg. of soap being added to 1 cubic inch of concrete. The building has stood one inundation well, while another building of the same material, without the soap, did not quite keep the water out. Subsequent tests were also favorable. The soap concrete is very cheap compared with other means used to render the concrete impermeable to water. The action of the soap seems to be that the lime of the cement is bound by the fatty acids of the soap.

The city of Sherbrooke is having a plant put in further up the Magog river for the purpose of lighting the town and supplying both light and power for the citizens on a commercial basis. The plant will be 2,000 h.p. and the approximate cost will be $100,000. Messrs. Morrow & Beatty, of Peterborough, are the contractors for the building operations. Tenders for the machinery are all in, but at the time of writing the contracts have not been awarded. The plant is to be finished by October.

Gypsum Beds on the Thompson River, B. C.

Just now it looks as if in a short time British Columbia is to have a very important industry or perhaps it were more correct to say a collection of industries, incident upon the discovery of gypsum on the Thompson river. Already the sum of $50,000 has been expended on the development of the work. The works will be located at Spatsum, on the main line of the C. P. R. 12 miles east of Spence's Bridge. The deposits are situated on the north side of the Thompson and are reported to surpass any others in western America.

A refining plant will, it is expected, be built on Burrard Inlet in the vicinity of Port Moody, with a capacity of 300 tons daily. There are, of course, many by-products obtained from the refining of gypsum, so that if the undertaking results in any where near fulfilling the expectation of its promoters, British Columbia will have on the banks of the Thompson, one of its best assets.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the Contract Record may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry:

142. **Steam road rollers, portable engines, centrifugal pumps, etc.**—An East Anglian firm manufacturing steam road rollers, portable engines, centrifugal pumps, etc., would like to get in touch with road contractors in Canada.

282. **Hardware of all kinds, radiators, plumbers' brass work.**—A firm of builders' hardware merchants in Dublin, Ireland, wishes quotations from Canadian exporters of various lines of hardware, etc. Further particulars on application.

323. **Agents.**—A Midlands firm manufacturing glazed tiles for interior decoration, and also encaustic floor tiles, seek suitable resident agents in Canada, with the exception of British Columbia, where they are already represented.

An increased demand is reported for the system of monolithic jointless pipe molds invented by Mr. Joseph Hickson, of the Hickson Sewer Mold Company, of Mount Gilhead, Ohio. The system saves much excavating in the bottom of the trench, as the bottom is shaped to fit the molding of shell, either flat or round base, thus avoiding any possibility of the settlement of the structure. The noteworthy feature of the Hickson invention are the forming plates held off from the collapsible centering by adjustible legs to any thickness of shell desired. We have at hand a number testimonials sent to the Hickson firm by prominent United States engineers. Mr. Geo. Irwin, city engineer, Deleware, O., says that the system is practical and economical and that it may be recommended for large sewers and culverts in city work. Mr. Chas. Perkins, ex-chief engineer, Ohio State Board of Public Works, states that the Hickson devices are suitable for building canal locks and hollow culverts, dams. Professor Eno, Ohio State University, certifies that with the Hickson system a true, monolithic concrete, jointless tube can be built, suitable for all kinds of waterways. Details of methods employed and cost involved in actual construction will be furnished on application to the inventor, Mr. Jos. Hickson, Mount Gilead, O. Mention the "Contract Record."

Bright Outlook at the Federal Capital

Ottawa's Plans call for Large Expenditures on Municipal and Public Works this Season—Trade and Market Developments

Ottawa, March 24, 1911.

The indications are that the wages for cheaper labor will be somewhat higher than last summer in Ottawa. The wages paid by the city will be increased all around for the men working on the streets. This increase will range from 8 to 10 per cent. While this does not entirely govern the prices paid by contractors it affects them to a certain extent. The city paid for ordinary laborers last summer 20 cents an hour for nine-hour day, and for man with horse and cart [illegible] a day.

Since there will be more effective work done during the summer by the city, the raise will be more effective than it would be otherwise. The city will not build quite as many sidewalks as usual this year, that is, not as much as last year. It built about 12 miles then and the indications are that this year it will be about 8 miles and will cost about $45,000. Sparks street will be repaved and this with the other permanent pavements will total about 3 miles and will cost somewhere about $200,000.

The great public work will be in connection with the extension of the sewer systems. The city has been empowered to spend almost $400,000 in sewer extensions, about half of this amount will be used this summer. Altogether ten miles of system have been authorized. This includes the west end or Hintonburg system which will cost about $296,000, the Dowe's lake system which will cost about $112,800, and subsidiary systems which will cost about $20,000. The drains will be from 6 feet down to 12 inches in diameter. There will also be considerable expenditures for repairs, etc., for which the estimate, including the scavenger system and snow cleaning, is fixed at $231,000.

About $25,000 will be spent in sewer systems and lighting systems at the Exhibition grounds.

The Ottawa Street Railway Company will do considerable extension work this summer, a large proportion of which has been already decided on. There will be double tracks laid from Somerset street down to Preston to Dowes lake with a loop at the end. There will be also extensions along Broad street anad to Bridge street. A temporary track will be laid along a portion of Wellington street, while the re-paving of Sparks street is under way. These extensions will total over two miles.

The Canadian Pacific Railway is making extensive plans for this season's changes in the Ottawa yards. The most important will be the erection of a large roundhouse containing 16 stalls. This will be erected just west of the present one in Hintonburg and will cost between $60,000 and $70,000. It will be entirely fireproof and will be of reinforced concrete. Tenders will be called for this work very soon and construction will be begun as soon as spring opens up. There ars also plans for changes in the trackage, much of which is necessitated by the change in the location of the roundhouse. Some smaller buildings will also be erected by the company in the yards.

The C. P. R. will also call for tenders for a reinforced concrete bridge at Graham station. This bridge will be about 500 feet long.

The extensive changes which are to be made in the Grand Trunk Yards have already been referred to and in some cases have been begun.

The big work of all will be the construction of the departmental building by the Dominion government on Mackenzie avenue, the revised plans of which are completed and tenders for which will soon be called.

The outlook for commercial building is the brightest in the history of the city. The biggest building on which architects are designing in Ottawa just now is the eight-storey building which will be erected on the corner of Elgin and Albert streets by Gordon Stewart and E. R. McNeill. But there are a number of smaller structures. Among these is one for Hiram Robinson on Queen street, the addition to a factory building for the Commercial Bank on Sparks street, and a number of buildings for stores, with apartments overhead, along Bank street.

McFarlane and Douglas are planning to extend their plant for sheet metal working and Mr. McFarlane will erect stores on Bank streets. Considerable additions will be made to the Watson Carriage Works where automobiles are to be manufactured as soon as machinery can be installed.

The Ottawa Vacuum Cleaner Company has taken over Frank Low's foundry on George street and will remodel it somewhat and begin at once the manufacture of vacuum cleaners. J. R. Booth is erecting a large building at the Chaudiere where the logs will be cut into the required lengths for pulp wood immediately on being taken out of the water.

Then of course there are a number of large buildings in course of construction. Chief among these is the Blackburn, of which the steel work for one section (about one-third of the total building) is completed. The work on this building will last for months. The Rosenthal building, the Hope building and the Rideau club are nearing completion, and work is being hurried on the Grand Trunk hotel and station.

There will be two large churches built this summer. One, the Bethany Presbyterian, will be of brick, the other, the First Congregational, will probably be a stone structure.

In most cases the prices of building materials will be about the same, perhaps a trifle higher. Lumber has gone up slightly. Cement work promises to cost more. While stone for this will remain about the same, gravel may be a trifle higher. It is selling now at 65 cents a cubic yard at the pit, while free gravel for roofing sells at $1.75 cents a cubic yard. Sand will be somewhat more expensive and cement itself its dearer. It is higher than prevailing prices last summer. The contractors are already receiving large numbers of orders for foundations for residences. They are signing up for these at about $6.50 a cubic yard.

A plan of the factory sites in and around the city which would give good railway facilities with the C. P. R., the G. T. R., the New York and Ottawa and the Canadian Northern Railways, has been prepared. The sites chosen have been selected with a view to providing good street car connections for the workmen. The plan was prepared by Cauchon and Haycock and shows seven large tracts which would be suitable in all requisites.

With everybody wishing good luck to the enterprise of the Canadian Northern Railway Company in its plans for the development of British Columbia, it is perhaps significant that the first steamer to dock at the new Port Mann wharf with steel rails for the Pacific division sported the Irish name Fitzpatrick, and that a second cargo arrived on March 17th.

Busy Season Opening up at Montreal

Office of the Contract Record,
March 24, 1911.

The spring rush in the building line has not yet set in but there are indications that the approaching season will be the busiest in the history of Montreal, providing strikes do not give operations a setback as they did last year. When there is an abundance of work employers usually fear trouble with labor. An official of the building trades states that he does not anticipate any strikes; but he also says that the journeymen carpenters have been asking the employers for a wage increase without much encouragement that they will have their request granted. He said that the men were unusually busy for this time of the year and there was no reason to complain on this score. Building operations have been under way in Montreal all the winter, particularly in connection with steelwork and the interior of big structures. Meetings between employers and representatives of the labor unions are being held every day for the revision of the wage schedules of the different sections of the building trade. Slight advantages are being asked all along the line and quite important concessions are demanded in certain instances but pending friendly negotiations the details of the proposed agreement are being kept close secrets by both sides. There appears to be a disposition on the part of both bosses and men to reach an amicable agreement and formulate principles of a general character for their guidance rather than fight over specific details of a petty character, and if the main regulations can be satisfactorily adjusted before work opens up it is believed and hoped that strikes will be obviated this year. The scale of wages, hours of work, systems of measurement and agreements for apprenticeship being disposed of in a rational manner there is less likelihood of trouble than if these matters had to be dealt with in the middle of the busy season.

Stinson-Reeb Company, of Montreal, Purchase Gypsum Deposits in New Brunswick

Mr. H. P. Timmerman, industrial commissioner of the Canadian Pacific Railway, has just completed an arrangement between the New Brunswick Government and the Stinson-Reeb Builders' Supply Company, Limited, of Montreal, whereby that company has acquired an area of a square mile of gypsum deposits at Plaster Rock, in the Tobique Valley, Victoria County, N.B. Mr. Timmerman has just returned from Plaster Rock, where he was accompanied by Mr. Kennedy Stinson and Mr. C. E. Barrie, chief chemist of the Canada Cement Company, upon an inspection of the property and also of the plaster mill belonging to the C.P.R. Company, which in this connection is under lease to Mr. Stinson. It was found that an exhaustible supply of the gypsum rock was available of a grade suitable to the manufacture of cement, and an order for twelve thousand tons of the crushed material already has been placed for delivery to the Canada Cement Company at Montreal and Hull, Que. It is intended also to extend the operation to the manufacture of gypsum products such as calcine plaster, plaster board, and blocks for building purposes, for which the demand is always increasing owing to their fireproof qualities.

Alberta Forms Provincial Builders' Exchange

At a meeting of the building exchanges of Edmonton, Lethbridge, Medicine Hat and Calgary, held in the last named city, a Provincial Builders' Exchange was formed. Mr. H. J. Goode, of Lethbridge, was elected the first president of the association, and Mr. C. C. Batson, of Edmonton, vice-president. , The following directors were chosen: C. Frost, Edmonton; H. T. Mooers, Calgary; C. D. Leader, Lethbridge, and A. Hook, Medicine Hat. One of the first matters which the association discussed was the validity of agreements between builders' exchanges and trade unions. Mr. H. G. Goode outlined briefly the objects of the provincial exchange. These were to handle such matters as are of a purely provincial character, concerning which it is not necessary to consult the parent body. Such subjects as legislation, agreements with architects, a uniform scale of wages and similar matters could be dealt with better by a provincial exchange, he said. Special committees were selected as follows:

Committee on by-laws and to draft a constitution—C. C. Batson, Edmonton; J. H. Garden, Calgary; J. A. Trimble, Medicine Hat; H. J. Goode, Lethbridge.

Committee to meet the architects and decide on uniform agreement in building matters—A. McSporran, Edmonton; W. J. Richards, Calgary; J. H. Preston, Medicine Hat; A. Smith, Lethbridge.

Liability insurance—A. E. Simpson, Edmonton; R. A. Brocklebank, Calgary; J. H. Preston, Medicine Hat; J. H. Thomas, Lethbridge.

Committee on resolutions—C. Frost, Edmonton; G. C. Christy, Edmonton; A. P. Burns, Medicine Hat; C. D. Leader, Lethbridge.

Committee on maximum scale—J. Dunlop, Edmonton; J. Marr, Calgary; J. D. Everard, Medicine Hat; W. R. Virtue, Lethbridge.

Those present were: J. J. Doyle, J. D. Thomas, E. Power, A. Smith, W. R. Virtue, A. C. Partridge, Jas. Glenister, W. Roy, T. R. Davidson, C. D. Leader and H. J. Goode, all of Lethbridge; A. McSporran, J. Dunlop, A. C. Simpson, P. Charlebois, C. R. Frost and C. C. Batson, all of Edmonton; Ald. R. A. Brocklebank, J. W. Albricht, Ald. J. H. Garden, H. T. Mooers, W. J. Richards, Geo. Christie, D. R. Foulds, J. Marr, W. J. Aldridge, of Calgary; and A. P. Burns, J. H. Preston, Jno. A. Grimble and E. D. Everard, of Medicine Hat.

It is now expected that 200 miles of the Grand Trunk Pacific Railway, east of Prince Rupert, B.C., will be ready for operation by the end of the year. At Prairie Creek, on the main line, 200 miles east of Edmonton, a large gang of men is now at work building the steel bridge which is to cross over the Prairie Creek gulch. Prairie Creek is the dividing line between the prairie anad the mountain. It has taken nearly five years to build this section of the road, stretching from Winnipeg to the end of the foothill country at Prairie Creek, the total distance being 900 miles. It will take another three years at least to complete the line over the mountains to the coast. One hundred miles of this line has already been completed east from Prince Rupert. This year another 100 miles will be finished from that end, while through the mountains, Foley, Welch & Stewart will build 100 miles from Prairie Creek to Tete Juan Cache, 40 miles west of the summit of the Rockies.

An extension thirty-five feet by sixty feet is being added to the offices of Messrs. Ross & Macfarlane, architects, corner of Belmont street and Beaver Hall Hill, Montreal. The addition will consist of two stories and a basement and will enable the firm to have all their draughting done on one floor as well as providing more room which their increasing business demands. The front will be of [illegible] to match the cut stone in the building now occupied. The interior will be artistic and modern. The contractors are Messrs. Peel & Peel, masonry; Geo. Roberts, carpentry; A. J. Wilson, painting and glazing; and Mr. Bowen, plastering

Personal News and Notes

The Duckworth Boyer Engineering and Inspection Company is opening a branch in Winnipeg.

F. W. Davies, electrical engineer, of Calgary, has severed his connection with the Canada Cement Company.

Edmonton has decided to apply to the Dominion government for power rights on the Athabasca river.

Berrington, Son & Watney, civil engineers, of Wolverhampton, England, intend opening a branch office in Calgary.

C. L. Trimingham, western representative of the Canada [illegible] Company, has taken offices in the Canada Life Building, Winnipeg.

Vice-president Fitzhugh, of the Grand Trunk and Grand Trunk Pacific, returned recently from a six weeks' tour of the Mediterranean.

Considerable building activity is reported from Nelson, B.C. Contractors there are rushing present work to completion in order to get an early start on larger jobs.

At the annual meeting of the B. Greening Wire Company, Limited, Hamilton, Ont., Mr. Norman S. Braden, of the Canadian Westinghouse Company, was elected a director.

Mr. W. H. Ford, of the Canada Cement Company, Limited, Montreal, is in British Columbia in the interests of his firm and is not expected to be back in Montreal until the middle of April.

Mr. H. B. Muckleston has been appointed assistant chief of the irrigation department of the C. P. R. Mr. B. S. Smith has been made assistant engineer in charge of right-of-way, townsites and architecture.

The city council of London, Ont., have asked Mr. A. H. VanCleve, city engineer, to reconsider his resignation and have made him an offer of $3,250 per annum. Mr. VanCleve resigned on the first of the month.

Geo. Anderson & Co., engineers and ironfounders, of Carnoustie, Scotland, and Montreal, have opened a branch at 504 Builders' Exchange, Winnipeg, for the purpose of looking after their western trade.

C. H. F. Carter and C. C. McKenzie, formerly in the employ of the Hinton Electric Company, have started in business at Victoria under the firm name of Carter and McKenzie, as general electricians and contractors.

Western Clays Company, Limited, an Edmonton concern, have just completed the installation of $20,000 worth of modern brick machinery and within a month they will be turning out pressed brick at the rate of 40,000 a day.

At the recent election of officers of the Canadian Bridge Company, Limited, of Walkerville, Ont., Mr. Chas. T. Miller was appointed secretary, Mr. B. S. Colburn, treasurer. Hitherto Mr. Colburn, as secretary-treasurer, had filled both offices.

Hon. G. P. Graham, Minister of Railways and Canals, estimates the cost of the new Quebec bridge at $11,000,000, and the time that will be involved in its construction at five years. The opinion is expressed in some quarters that the cost will be nearer $25,000,000.

The remodelled design for the new departmental block on Mackenzie avenue and Sussex street, Ottawa, is now awaiting the final approval, upon which it is expected that tenders will be called immediately. The cost of the proposed building is placed at $3,000,000, at the lowest estimate.

The city of Winnipeg recently called for competitive plans for a new hospital at Riverview to cost $200,000. Considerable apprehension is now felt on account of there having been thirteen plans submitted. It would seem that architectural competitions are bound to meet with bad luck.

Application is to be made at the next session of the Ontario Parliament for an act incorporating a company under the name of the Niagara Frontier Railway, with power to construct an electric railway from Fort Erie, through Niagara Falls, to the town of Niagara.

At a recent meeting of the council of the Alberta Association of Architects, Held in Calgary, it was decided to promote competitive design, and printed copies of proposel regulations will be sent to each member of the association. It was also decided to start a library for the use of architects and students in Calgary and vicinity.

The Cabinet has approved plans for the propsed Plaza Laurier at Ottawa, and it is stated that the work will be undertaken at once. The Plaza will be 280 feet wide at the western end and 290 feet at the eastern end. A group of statuary will occupy the centre. The masonry abutments of the bridges will be replaced by steel structures.

The civic employees of Ottawa, Ont., have had a general boost in their wages. The minimum and maximum salary of the assistant city engineer, Mr. Parsons, has been increased from $1,500 and $2,000 to $1,800 and $2,400 respectively. Mr. Parsons is now receiving $2,000. Building Inspector Fotheringham will receive $1,250, rising to $1,500.

The town of Farnham, Que., is having an electric plant installed that is to be ready for operation in April. It will provide 1,000 h.p. and furnish light and power for the corporation and for commercial purposes. The building operations are in the hands of the Bishop Construction Company, Limited, while some of the machinery is to come from England and some from Sweden.

The Montreal Board of Control has instructed Mr. T. W. Lesage, superintendent of the waterworks department, to go to New York to consult with Messrs. Hering & Fuller regarding the final plans to be adopted in connection with the civic filtration plant. It is estimated that the work will take three years to complete. Arrangements are now being made for the flotation of a loan to cover the expenses of the project.

The death occurred recently at New York of Mr. John B. Macdonald, a well known contractor, among whose most noteworthy undertakings were the construction of the first underground railway in New York and the tunnelling under the city of Baltimore for the Baltimore and Ohio Railway. Of his Canadian enterprises may be mentioned the Georgian Bay section of the Canadian Pacific Railway. He was born in Ireland in 1844.

News of the death of Mr. W. H. Laurie, of Montreal, came as a great shock to the engineering profession throughout the country. The late Major Laurie died suddenly in his sleep while on the train journeying from Truro to Sydney. He was born in Montreal some 60 years ago and was of Scottish parentage. As an engineer he was held in high esteem. He was one of the older members of the Canadian Society of Civil Engineers.

The Dennis Wire & Iron Works Company, Limited, London, Ont., have secured well appointed and commodious offices at 12 Queen street east, Toronto. These quarters are centrally located and will be easy of access to the company's customers and friends. Mr. C. R. Eberhard, C.E., the Toronto manager, and Mr. T. H. Wood, his assistant, will be pleased to show their excellent display of metal lockers and specimens of the company's work in metal grills, wickets and other iron and bronze work.

At the monthly meeting of the Winnipeg Builders' Exchange there was considerable discussion regarding the advisability of adopting a standard rule of measurement for use in the various trades. A vote of thanks was accorded the London, Ont., Builders' Exchange for their services in connection with the recent annual convention of the C.N.A.B. in Winnipeg. The bonspiel smoker was fixed for March 28th. The presentation of cups and prizes was arranged for, also an elaborate musical programme.

According to an advice from Cobourg, Ont., J. Lyle Crossen, son of the president of the Crossen Car Company, and Percy Clarke, son of Samuel Clarke, M.P., have organized and received a charter for a company to be known as the Winnipeg Steel Granary and Culvert Company, Limited, capitalized at $100,000. It will have headquarters and a plant in Winnipeg and a branch at Regina, and will manufacture corrugated steel products of all kinds, chiefly for the use of railroads and municipalities.

With the object of exploiting and developing limestone, brick-clay, silica and mineral properties on Nelson Island, Vancouver, capitalists have organized what is to be known as the British Columbia Mining, Industrial & Development Company, Limited. The immediate development plans include the building of a lime kiln, a brick plant and later on a cement plant on a large scale. According to the present plans of the company, Nelson Island lime and brick will be on the market this summer.

The Winnipeg plant of the Dominion Bridge Company, Limited, is now in operation. Extensive alterations and improvements have been made. It is fitted with the most modern machinery and has a capacity of 15,000 tons per annum. The company has in Winnipeg a large and complete stock of structural steel of all kinds, and a full staff of engineers and draftsmen. They have in the past supplied steelwork for many of the prominent buildings in the west, including the C. P. R. depot and train shed, the Royal Alexandra Hotel, Fort Garry station and train sheds, the McArthur building, Union Bank building and many others.

A proposition to turn over to the city of Edmonton at the end of three years an equipment complete, capable of delivering at the corporation line 20,000 horse power of electrical energy from Rocky Rapids, on the Saskatchewan river 60 miles from Edmonton, for the sum of three million dollars was made by the Edmonton Heat and Power Company at a recent meeting of the city council and the public works committee. At the present time the company owns only the right to develop power at the rapids for 84 years.

The Kelowna Irrigation Company, Limited, of Kelowna, B.C., who are opening up a large tract of orchard land, will put in ten or twelve miles of wood pipe system this spring. The Dominion Wood Pipe Company, of New Westminster, has been awarded the contract. This company are also supplying pipe for a system to be put in by the Richland Fruit Company, who own a large area or fruit land about 40 miles from Vernon. The first installment of pipe, comprising 25,000 or 30,000 feet of 14-inch and 16-inch diameter, is now being hauled over snow roads from Vernon to Richland.

Canadian Railroad Development

Macdonnell, Gzowski & Company, Vancouver, B.C., will begin work about July 1 on their contract for constructing the second 30-mile section of the Kettle Valley Railway.

From the Canadian Rand Company, Limited, Commercial Union Building, Montreal, Que., we have received a leaflet containing concise descriptions of several of the many classes of Rand air compressors. These machines are standards of economy and reliability. They are built at the largest plant in Canada devoted exclusively to the manufacture of compressed air machinery. Full descriptive catalogue containing valuable information to engineers and contractors may be obtained upon application to the company.

The Grand Trunk Railway, during the present season, is to lay 100-lb. steel rails on its double-track line between Niagara Falls and London, Ont., in place of the 80-lb. rails now in the track. The heavier rails were put down last year on the entire Montreal-Toronto line. The other line will probably be equipped with automatic block signals. Extensions are planned of the telephone system for train dispatching, 250 or 300 miles to be added between Toronto and Sarnia, and so completing the service in the northern division. The line between Montreal and Toronto will also be rock-ballasted.

The Canadian Northern Railway has so far this year placed orders for 90,000 tons of 80 to 90-lb. steel rails for delivery this year. They will cost above $3,000,000. A great proportion of the rails came from Sydney, C.B. These will be laid in Ontario and the prairie provinces. Last season 548 miles of steel were laid in Manitoba, Alberta and Saskatchewan. Grading for 520 miles of rails more in those provinces has been completed, and this work will be continued this coming summer.

Mr. A. Price, general superintendent of the Alberta division of the C. P. R. states that the company will shortly start the improvements on the Calgary division. The new wing to be added to the station at Calgary will be commenced as soon as possible this spring, and two new double-track bridges, one across the Bow river and the other across the Elbow river in East Calgary, each to cost $150,000, will be started right away. Work will also be commenced on the C. P. R.'s new hotel in Calgary, and new stations of a special design will be built at Lacombe, High River and Claresholm.

The Canadian Northern Railway is understood to be running location surveys for a railway line from Winnipeg to Fort Alexander on the east side of Lake Winnipeg, where it is proposed to establish a summer resort. It is not known whether the line will be a continuation of the C. N. R. Bird's Hill branch or of the electric line that runs out of Bird's Hill road to the limits of Kildonan. The survey stakes are said to be set from the end of the latter road direct to a point between the river and East Selkirk. From that point it will run direct to the Fort, but a spur will be built to connect with the beaches.

Phelan & Shirley, Omaha, Neb., are making good progress with their contract for constructing the branch line of the Grand Trunk Pacific south of Edson, and the line will probably be ready by next fall. The branch will require two tunnels and about 24 bridges. The bridge contracting firm of Creelman & Verge, which has the contract for all the bridges on the branch line, as well as the big Prairie creek and Athabasca river bridge on the main line, has gangs at present working on the concrete of the big Prairie creek bridge, 65 miles west of Edson on the main line.

The American Ditching Company, of West Minneapolis, has sent us an informative and well illustrated booklet, descriptive of the "American Ditcher." The makers of this machine believe it to be scientifically and mechanically perfect. It is so rigidly constructed that its durability is assured and break-downs are almost impossible. The "American Ditcher" is readily adaptable to varying conditions, is easy of control and economical in operation. Only one man is required to run the machine and the working expense is figured out at $12.85 a day, this being given as a probable maximum. It is claimed that the machine will dig a ditch six feet deep and 24 inches wide under any reasonable conditions at a minimum rate of 180 linear feet, i.e., 80 cubic yards, an hour. At this speed it digs 3 feet per minute and over 100 rods a day. Contractors should write to the company for further information and catalogue.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brampton, Ont.

Tenders addressed to W. C. Young, town clerk, will be received until April 11th for construction of about 8,000 sq. yds. of pavement and 3,500 lin. ft. of concrete curb and gutter. Plans, etc., at office of W. M. Treadgold, town engineer.

Coquitlam, B.C.

A by-law to raise $150,000 for road purposes will likely be submitted shortly. J. R. Grant, New Westminster, municipal solicitor.

Guelph, Ont.

Tenders addressed to city clerk, will be received until March 30th for construction of cement sidewalks required by the city for current year; also for supply of sewer pipe and Portland cement required this season. Jas. Hutcheon, city engineer.

Kerrisdale, B.C.

A by-law was submitted to provide $175,000 for sewer and water extensions, including house connections; also a by-law providing for $50,000 for an incinerator for the health department. W. F. Heal, city clerk.

The question of the purchase of a steam traction plant for the purpose of hauling rock for the roads, is being considered by the Point Grey council. Acting Reeve Churchill and Councillor Adams are interested.

Lethbridge, Alta.

A by-law to expend $29,100, the largest portion of which ($18,000) will be spent on concrete walks—the rest on mains, storm sewers, electric light, conduits and cables, etc., was carried.

Moose Jaw, Sask.

The Sewer and Water Committee recommended that City Engineer Wilson secure the services of Walter J. Francis as consulting engineer to gain information for the council as to the best methods of procedure an adequate permanent water supply. Further, that the order for iron work for the paved districts be forwarded at once to the Canada Iron Corporation, Limited.

North Toronto, Ont.

The council will have laid this year three miles of concrete sidewalks.

Tenders for construction of sewage plant here will be called shortly. T. Aird Murray, consulting engineer. E. A. James, engineer.

Oakville, Ont.

Tenders addressed to the Chairman of the Board of W. and L. Commissioners, will be received until April 5th for the following: (a) labor for pipe-laying; (b) furnishing c.i. pipes and specials; (c) furnish fire hydrants, valves. Plans, etc., at office of the engineers, Chipman & Power, 204 Mail Building, Toronto. C. G. Marlett, chairman.

Ottawa, Ont.

The board of control recommend that in view of the large amount of construction to be carried out by engineer's department under day labor system, the main portion of the west end drainage should be done by contract work, and that tenders should be called.

Mayor Hopewell will ask the city council to authorize the preparation of plans and specifications for a purification plant for Ottawa river water for the city supply and alternative plans and specifications for bringing the water from McGregor Lake. This is to save time after it has been decided which is the best place from which to take the city's supply of water.

Quebec, Que.

Tenders addressed to J. Gallagher, W. W. Engineer, will be received until April 11th for iron castings; brass castings; lead pipe and pig lead; cement; brick and drain pipes.

Regina, Sask.

The by-laws providing $15,000 for waterworks; $18,000 for sewerage and $22,000 for street cleaning, were carried.

Tenders addressed to A. J. McPherson, city commissioner, will be received until April 17th for supply of 46,000 sq. ft. of galvanized iron sheeting. Plans, etc., on application to the Chief Engineer, Trunk Sewer Works.

Ridgetown, Ont.

The ratepayers will shortly vote on a waterworks proposition to install a plant to cost about $30,000.

St. Thomas, Ont.

Tenders addressed to M. H. Baker, acting city engineer, will be received until March 31st for the necessary artificial stone, sidewalks curbing, and curbing and gutters to be constructed during the current year. Plans, etc., at office of the above.

Walkerville, Ont.

Tenders are called until April 11th for construction of brick sewer here. Owen McKay, C.E., engineer; Cecil H. Robinson, town clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Watrous, Sask.

The council has accepted to furnish the citizens with water and in conjunction with this to establish an electric light plant. It is proposed to carry water into the town by a pipe line from a fresh water lake northeast of here.

Wetaskiwin, Alta.

Tenders will be received at the office of the Resident engineer, C. P. R. Co., Calgary, until April 8th for digging, laying and back filling pipe line for water supply here. Further information obtained from T. J. Brown, Resident Engineer, Calgary.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until April 4th for supply of from 25,000 to 30,000 bbls. of cement f.o.b. city yards. Specifications, etc., at office of City Engineer. M. Peterson, secretary.

Tenders addressed to the Chairman, Board of Control, will be received until April 5th for manufacture and erection of horizontal turbine pump of 2½ gals. capacity per 24 hours. Specifications, etc., at office of city engineer, 223 James avenue. M. Peterson, secretary.

AWARDED

Brandon, Man.

A contract for waterworks supplies has been awarded to the following: James Robertson & Co., Winnipeg, for headpipe, $4.86 per 100 lbs.; pig lead $4.03 per 100 lbs. Johnson & Co., Brandon, for brass goods, "Mueller" manufacture.

Calgary, Alta.

Following are the tenders received for sidewalks: Davidson and Westaway, curb and gutter, 58c.; sidewalks with filling, 13c.; total, 71½c. Calgary Construction Co., curb and gutter, 50c.; sidewalks with filling, 10c.; total, 60c. Dan McGrath, curb and gutter, 59c. Forest City Paving Co., curb and gutter, 56c.; sidewalks with filling, 9 7-10c.; sidewalks without filling, 8½c.; total, 65 7-10c. Crown Paving Co., curb and gutter, 52c.; sidewalks with filling, 10¼c.; sidewalks without filling, 8½c.; total, 62¼c. Calgary Paving Co., curb and gutter, 65c. McKibbon Bros., sidewalks with filling, 10⅜c.; sidewalks without filling, 8½c. McKibbon Bros., sidewalks with filling, 11½c.; sidewalks without filling, 9⅞c. F. Farenback, curb and gutter, 48c.; sidewalks with filling, 9¾c.; sidewalks without filling, 8c.; total, 58¾c. F. Farenback, whose tender was the lowest of those received by the commissioners, was accepted. The price for curb and gutter will be 46 cents per lineal foot, and for the sidewalk without filling 9¾c.; and without filling 9c. per square foot. The total of Mr. Farenback's tender is 57¾c. and 56c. His price was considerably less than the others received.

Coldstream, B.C.

We are informed that the Dominion Wood Pipe Company, Limited, furnished the special castings in the installation of waterworks system, $228; also the stop valves, $330, tenders for the latter ranged from this to $350. Jas. C. Kennedy, 413 Pacific Building, Vancouver, engineer in charge.

Edmonton, Alta.

The contract for the supply of sewer pipes required this year was given to the Standard Plumbing and Heating Company, of Edmonton, and the contract for galvanized and lead pipes to the Western Supplies, Limited. Edmonton.

Victoria, B.C.
The bid of the Worswick Company which the committee recommended the acceptance of is for a five-inch concrete base and a one-inch wearing surface, with a five years' guarantee bond of 25 per cent. of the cost of the pavements. This refers to View and Fort street paving.

Railroads, Bridges and Wharves

Calgary, Alta.
Work will be started next month on the two C. P. R. bridges across the Elbow river, each to cost $150,000. For further information address J. S. Dennis.

Carleton Place, Ont.
The Lanark Councy Council have under consideration the adoption of a report to the effect that the bridge over the Clyde, for which tenders on wooden structures were asked, should be of concrete, according to plans and specifications furnished by Messrs. Holmer & Winstanley, of Morrisburg, at a cost of $3,700. Reeve, J. Boyd Caldwell.

Edmonton, Alta.
The C. N. R. will commence construction this summer of the quarter million dollar bridge on the main line west over the Pembina and Macleod rivers.

Fergus, Ont.
Engineer Connor has been instructed to draw plans, etc., for a new cement arch bridge to replace the Tower street bridge. County Roads Committee is composed of Chairman Wilkinson, Warden Fox, Road Superintendent Young, and others.

Hintonburg, Ont.
The C. P. R. will erect a new roundhouse here that will cost between $60,000 and $70,000. The plans have been prepared, ,and tenders will be called for at once. It will be in the form of a semicircle, and there will be sixteen engine stalls in the building. The structure will be of reinforced concrete, with a fireproof roof, and will be absolutely fireproof.

Kingston, Ont.
Tenders are called until April 5th for construction of bridge over Cataraqui river. H. B. Craig, city engineer.

Montreal, Que.
The C. P. R. will this year establish 50 new town sites, mostly in Alberta and South Saskatchewan just north of the boundary line. It is said that the company will run feeders or branch lines from Minneapolis, St. Paul and Sault Ste. Marie lines into the neighboring sections of the United States in furtherance of the development of its commercial and immigration policy.

The Harbor Commissioners have approved the plans which call for the expenditure of two and one-half millions.

Sault Ste. Marie, Ont.
The Ontario Dock Co., it is reported, will add 200 ft. of new dockage and a 600-ft. slip to its property here. Estimated cost, $100,000.

Swan River, Man.
The C. N. R. will build a new steel bridge over the river here, the estimated cost being over $20,000. Superintendent Fisher.

Toronto, Ont.
The appeal of the C. P. R. against the order of the Dominion Railway Board for the construction of a four-track viaduct along the Esplanade, was dismissed by the Privy Council on the 25th inst.

The plans for the floating dry dock to be built by the Polson Iron Works have been approved by the Public Works Department, Ottawa. Col. J. B. Miller, president. Cost, about $700,000. Application has been made for a subsidy.

AWARDED

Edson, Alta.
The contract for building the concrete piers for the bridge to be erected over the Macleod river for the Grand Trunk Pacific Edson-Brazeau branch railway, has been awarded to Collins Bros. and Hamilton, of Heatherwood, Alta.

Red Deer, Alta.
The contract for 100 miles of railway grading and ballasting of the Alberta Central Railrway, and 36 miles east, was awarded to Tanse McDonald & Co., by President John T. Moore and Chief Engineer J. Grant McGregor. The price is $25,000 a mile, a total of $2,500,000. The work was first specified to the completed by the end of August, but an extension of fifteen days is in the contract.

Vancouver, B.C.
The C. N. R. Company has awarded to H. Chase & Company of Seattle, the contract for the temporary fill-up trestle to be constructed at the head of False Creek from Park lane up to the western end of the Grandview cut.

The C. P. R. has awarded contracts for the construction of a new ten-stall addition to the engine house at their False Creek yards. Construction work has been commenced and it is the intention to have the building completed in July.

Winnipeg, Man.
The Cleveland Bridge & Engineering Company, Limited, have just been awarded contracts for two bridges in Winnipeg. One is a highway-crossing being a double-track 80-foot girder span, and the other a double-track viaduct 300 feet long for the National Tran-continental Railway Company, crossing over the Canadian Northern Railway tracks. The work is to be completed in both cases by September 1st. The manufacturing is done in Darlington, England, where the company's works are situated. The Montreal office prepares the designs and supervises the construction.

The following are the contracts awarded by C. N. R.: Cowan Construction Company, 200 miles on main line from Edmonton toward Yellowhead Pass; 200 miles from Alask to Calgary, on the Maryfield extension; 90 miles from Redville to Moose Jaw and Maryfield extension; 35 miles on Jackfish extension, from North Battleford toward the Peace River country; 80 miles from [illegible] to Battleford; Northern Construction Company, 100 miles from Red Deer to Calgary; 200 miles grading and construction on main line from Vancouver toward Rockies. Amount of expenditure, $8,000,000.

Public Buildings, Churches Schools, etc.

Berlin, Ont.
The cost of the new wing to the Berlin-Waterloo hospital is estimated at about $24,000.

The sketches prepared by F. Grayson Brown, architect, of Hamilton, were presented to the Berlin-Waterloo Hospital Board. According to these $15,000 would be required from each county. The Matter was referred to town council.

Brandon, Man.
Tenders addressed to R. Rogers, Minister of Public Works, will be received until March 31st for erection of Hospital for Insane here. Plans, etc., at office of the Provincial Architect, S. Hooper, Fort Garry Court, Winnipeg.

Calgary, Alta.
Plans for the new market building are almost ready, and it is expected work will be started in a day or so. The building is to cost $50,000, and will be erected on Fourth avenue and Third street east.

Cornwall, Ont.
The house of refuge committee of the county council has accepted the plans of A. L. Weeks, of Ottawa, subject to certain modifications arranged for by the committee. The estimated cost is within the $40,000 fixed by the counties council.

Edmonton, Alta.
It is understood that a new site in Hudson's Bay reserve has been purchased by Cushing Bros., Limited, for their plant. Saskatoon is mentioned as a possible location for another factory.

The Building Inspector has been given instructions to prepare plans for an office building for the accommodation of the city commissioners. Estimated expenditure, $10,000.

Tenders addressed to John Stocks, Deputy Minister of Public Works, will be received until April 8th for supply and construction of the following in connection with erection of Court House: (a) plumbing, sheet metal, roofing and heating; (b) electric conduit wiring; (c) tile and marble work. Plans, etc., at engineer's office, new Parliament Buildings, or at branch office, Department of Public Works, Calgary.

Fernie, B.C.
It was decided, with the sanction of the ratepayers, to enlarge the Central school to a sixteen roomed building. A by-law will be submitted to raise by debentures $45,000 for building and equipping the enlarged school.

Fort William, Ont.
Excavation has been started for the new Salvation Army Citadel. Captain Walker is interested.

The plans of architect D. W. F. Nichols, Winnipeg, associated with R. E. Mason, of this city, have been accepted for the new Y. M. C. A. Estimated cost, $80,000.

A by-law covering cost of addition to Central school will probably be submitted shortly by council. Architect Mason's previous estimates of $68,000 were found not to cover total cost.

Guelph, Ont.
A by-law will be submitted to the ratepayers to provide for issue of

debentures to pay for new fire hall and [illegible].

Plans, etc., for an Infection Hospital will be received by [illegible] Moore, city clerk, until April 15th.

Mr. [illegible] has been appointed chairman of the committee in charge of the campaign to raise $30,000 as a building fund for the Y. M. C. A.

Hamilton, Ont.

The Public Works Department, Ottawa, Ont., are calling for tenders for the [illegible] Custom Buildings on Stuart street until April 8th. R. C. Desrochers, secretary.

Ingersoll, Ont.

The site selected for the armories was inspected by Col. Caldwell, Toronto, Department of Militia, Major W. A. Ed[illegible] and others.

Kaledon, B.C.

Tenders are called until April 7th for erection of 2-room school here; also for school at Hammond until April 10th.

Kerrobert, Sask.

Plans and specifications for the $8,000 immigration building are to hand, and local contractors are to figure upon the construction. The building will be on C. P. R. land.

Kamloops, B.C.

The following have been appointed as a committee to consider the possible establishment here of a large boarding school for boys: Messrs. J. M. Harper, J. L. Brown, F. J. Fulton, K.C., and Mayor Robinson.

Kingston, Ont.

The ratepayers approved of the raising of debentures of $40,000 for a new public school.

Tenders addressed to the Secretary, School of Mining, will be received until April 1st for the cabinet work comprising tables, benches, cupboards and other furniture, and also plumbing and fitters' works, required in the completion of the Chemistry Building. Power & Son, architects, Kingston.

Lethbridge, Alta.

Pending the voting on the by-law to provide the sum of $100,000 for the improvements at the agricultural grounds, the council authorized an advance of $35,000 for the purpose of construction of the main building only.

Merritt, B.C.

A new 4-room school will be erected. As soon as the site has been selected tenders will be called.

Moose Jaw, Sask.

Tenders for large frame stable, grand stand, judges' stand, are called until April 1st. Address, Secretary, P. O. Box 1812. Building must be moved by May [illegible].

Rev. A. A. Graham, pastor of St. David's Presbyterian Church at St. John, N.B., has been appointed principal of the residential college for boys to be erected here.

J. A. Blix has placed before the council a proposition concerning the establishment of a school or college in this city by the United Norwegian Lutheran Church, for which a grant of land is asked. W. F. Heal, city clerk.

Niagara Falls, Ont.

The charter for the new Arena has been granted and a suitable building site is being bought.

North Vancouver, B.C.

At a special meeting of the board of health committee it was decided to ask the engineer to prepare plans and estimates for an isolation hospital.

North Bay, Ont.

The Methodist Church board have offered the vacant lot next the church for the consideration of the council as a suitable site for the public library.

New Westminster, B.C.

It is understood that a wing will be added doubling the present capacity of St. Ann's convent. Construction work will probably not commence until next year; St. Mary's hospital will also be enlarged.

Owen Sound, Ont.

The Library Board has decided to ask the council for a building site in Queen's Park. Mr. J. H. Packham, director.

Otter Point, B.C.

The residents of this district have decided to erect a new and more commodious public hall.

Ottawa, Ont.

A. Leb. Weeks has been selected architect for the new Congregation Church.

The Dominion Government will erect a testing station for explosives on Division street.

The Board of Control will recommend the erection of a contagious disease hospital on Portage Island which will cost about $25,000.

Tenders will be called very soon for the re-roofing of Howick Hall in order that it may be completed for the horse show which opens on May 1st.

C. P. Meredith has been selected architect for a theatre to be erected for St. Denis Lemoine, extending from Queen street to Sparks, with entrances on both streets. The theatre will accommodate about 1,200 people and will be modern in every respect. It will be built of brick and steel.

Pembroke, Ont.

Under date of last information the contracts for public library had not been awarded. The estimated cost is $12,000. Building will be brick with stone foundation, 50 x 60 ft., one storey and basement. A. J. Fortier, town clerk.

Renfrew, Ont.

Tenders addressed to J. A. Stubinsky, secretary-treasurer, R. C. S. School, will be received until April 1st for erection of school here. Plans, etc., at office of F. M. Devine. C. P. Meredith, architect, Ottawa.

Regina, Sask.

Messrs. Brown & Vallance, architects, Montreal, report that tenders are being called for the Regina College building.

The school board have decided on a four or six room addition to the Albert street school at once; also a four or eight room addition to the Victoria school without delay; also the purchase of three sites for schools to be erected when required.

The by-law to donate $15,000 to the Y. M. C. A. carried.

Stanstead, Que.

Stanstead is likely to have a new armory. Major A. C. Hanson, of Coaticook, is interested.

Saskatoon, Sask.

The council will alter the King Edward school, making it suitable for the civic offices, and instead of going through with the plans for a $150,000 city hall will build a new school.

Sherbrooke, Que.

Tenders are called until April 10th for construction of school on Drummond Road. Plans, etc., with C. O. Palmer, secretary, Tuck's Block.

The Board of Protestant School Commissioners will call for tenders for the erection of a new school building on Drummond street.

The Redemptorist Fathers will erect a monastry on the property they recently acquired on Beckett road. Instructions have been given to Mr. Louis Audet to prepare the plans. The proposed buildings will cost $80,000. The contract will be let early in the spring and the work proceeded with as early as possible.

Toronto, Ont.

The Governors of University College will erect a new pavilion to seat 2,000 spectators, in the extended athletic field. Plans for extension of Wycliffe College were approved.

Tenders addressed to the Chairman of the Joint Building Committee of the Y. M. C. A. will be received until April 5th for erection of the West-End Building. Burke, Horwood & White, 28 Toronto street, architects.

Tenders addressed to Symons & Rae, architects, 15 Toronto street, will be received until April 1st for the various works required in the erection of a building for the North Broadview Presbyterian Church.

Tenders addressed to W. C. Wilkinson, secretary-treasurer, will be received until March 31st for erection of new school on Caledonia road. Plans, etc., at office of the board, City Hall. W. W. Hodgson, chairman of committee. Advertisement in "Tenders and For Sale Department" of this issue.

The enlargement of school accommodation upon which it is proposed to spend half a million dollars, is as follows:

Roden school, 8-room addition to the front of building, $40,000; Earl Grey school, 16-room addition for second and third storeys to complete the building, $75,000; Frankland school, 6-room addition of third storey to complete the building and to provide for building erected last year, $85,000; Hillcrest school, 8 rooms, new building, $40,000; Ogden school, 2 rooms, addition to third storey on rear wing, $8,000; Manning avenue school, 6-room addition to complete the new building, $30,000; Essex street school, 9-room addition to the front of building, $43,000; Earlscourt school, 6 rooms, addition to the front of building. This neighborhood being further provided for eastward by the new McMurrich school and westward by the new school on Caledonia road, $30,000. Caledonia road, 9 rooms, to supplement estimate of 1910, $45,000; Annette street school, 16 rooms addition of second and third stories to complete the new building, $75,000; Fern avenue school, 6 rooms, addition to east side of building, $30,000.

Victoria, B.C.

The congregation of Knox Presbyterian Church have authorized the board of managers to purchase a site for a new church. S. J. Drake, chairman.

Mr. Loring D. Rixford, San Francisco, has been chosen architect for the new Union Club building, which will occupy a floor space of 100 sq. ft. Estimated expenditure, $150,000.

Vancouver, B.C.

Tenders are called for the building of 12-room addition to the school, corner of Charles and Templeton streets; also for addition to the Tennyson school, consisting of 8 rooms with auditorium. Later tenders will be called for 8-room additions to the following schools: Mount Pleasant, West Kitsilano, and North Kitsilano. N. A. Leech, architect.

Woodstock, Ont.

Authority was given the building committee of Chalmers' Church to make and sign contracts for the erection of the building which will be on the old site.

Westmount, Que.

Messrs. Hutchison, Wood and Moller were appointed architects to prepare the plans for the new fire station on the Boulevard.

Winnipeg, Man.

Tenders addressed to H. B. Rugh, architect, Union Bank Building, will be received until April 7th for erection (except plumbing, heating and lighting) of a sanatorium building for the Manitou Sanatorium Company, on Lakeview Beach, Little Manitou Lake, Sask.

Tenders are called by the Public School Board until April 11th for erection of a 12-room addition to the Strathcona school on McGregor and Burrows streets. Plans, etc., on application to J. B. Mitchell, commissioner of buildings, school board office. R. H. Smith, secretary-treasurer, W. P. S. B.

Tenders addressed to the Chairman, Board of Control, will be received until April 3rd for supply of labor and materials, required for the erection of two patrol houses and stables, near Tyndall, Man., and Lac du Bonnet, Man. Specifications, etc., at office of Smith, Kerry & Chace, power engineers, Carnegie Library Building. M. Peterson, secretary.

AWARDED

Lethbridge, Alta.

The contract for the erection of the main building for Exhibition has been awarded to Smith Bros. & Wilson. The cost will be about $35,000

London, Ont.

The Blonde Lumber and Manufacturing Company being the lowest tenderers, were awarded the contract for erection of new R. C. Church and rectory, at the sum of $43,262. J. L. Wilson & Son, Chatham, architects.

Montreal, Que.

The church authorities of the parish of St. Stanislas parish (Catholic) of Montreal, will build a church on St. Joseph Boulevard, with Guilford street on one side and Garnier street on the other, at an estimated cost of [illegible]. The architect is Mr. Alph. Venne and the general contractor, Mr. Boileau.

Toronto, Ont.

The contract for the galvanized iron, slating, skylight and metal ceiling work on the Woman's Building, Exhibition grounds, has been awarded to A. B. Ormsby, Limited. Messrs. Wickett Bros., general contractors.

Welland, Ont.

The contract for the new Welland Club house has been let to Mr. McKissock, of Toronto. Work has been begun on the contract and the building is to be done by June 1st. Cost, about $20,000.

Winnipeg Beach, Man.

The contract for municipal hall here was awarded to S. B. Ritchie, Winnipeg, $2,797.

Residences

Edmonton, Alta.

The Edmonton Apartment House Co., a newly organized company, will erect a 6-storey apartment block on the Hardisty property. W. A. Griesbach, of Edmonton, is the solicitor. F. W. Sykes, England, and G. J. Kinnaird and R. Hardisty, of Edmonton, are provisional directors.

Lethbridge, Alta.

Matson & Carlson have permits for three large houses to be built on the corner of 4th Avenue and 15th Street south, $13,300.

Montreal, Que.

Messrs. Brown & Vallance, architects, report that tenders are being called for four residential houses in Pine avenue for Messrs. Robb & Brown; also for house in Westmount, for Mr. J. W. Blair.

Vancouver, B.C.

Plans were presented for two large apartment houses, that for Mr. Young shows a 4-storey block, 66 x 129 feet; the other a building, 5-stories, frontage 198 ft. on Haro street, running back along Thurlow street for 122 feet.

Victoria, B.C.

Mr. G. C. Mesher is the architect for the erection of the Savoy Mansion apartment house on Victoria Crescent.

AWARDED

Ottawa, Ont.

M. M. O'Connell, plumber, has been awarded the contract for plumbing a residence for Sir Henry Bate on Sandy Hill.

Victoria, B.C.

Work has commenced upon the new 3-storey apartment house being erected for Mr. Max Leiser. J. L. Skene, contractor; Thos. Hooper, architect.

Business Buildings and Industrial Plants

Bay of Islands, Newfoundland.

A large United States packing concern purposes establishing five cold storage plants in Newfoundland within the next five years at a cost of about $500,000 or more. An option has already been secured on the whaling plant at Lark Harbor, Bay of Islands, where the company will erect its first establishment. This plant was constructed several years ago, at an outlay of [illegible] and, as an immense herring trade is done in the vicinity, the outlook is most promising.

Calgary, Alta.

The Molson's Bank of Canada is having plans prepared for a bank building.

Plans have been prepared for a [illegible] storey block for [illegible], to cost about [illegible]

Cobourg, Ont.

Specifications are being perpared for a G. T. R. station here.

Edmonton, Alta.

The Petrie Manufacturing Co., of Hamilton, Ont., have purchased a warehouse site where a fireproof building will be erected.

Fort William, Ont.

The Plans for gigantic grain elevators at West Fort William on Lake Superior by the Grand Trunk Pacific Railway show three big piers devoted to the grain traffic on which will be placed six elevators of 10,000,000 bushels capacity each. The plans provide for the handling of 2,400 cars a day in these elevators.

Galt, Ont.

The Galt Town Council has decided to spend $12,000 in the purchase of a 120 acre farm, part in to town limits and part outside, to be devoted to industrial purposes.

High River, Alta.

Negotiations are in progress for the location of a beet sugar factory here.

Hanover, Ont.

On April 3rd a by-law to grant aid by way of loan of $5,000 to A. Glaeser and P. Leinberger, to assist them in erecting additions to a factory, etc., will be submitted to the ratepayers. John Taylor, town clerk.

Kerrobert, Sask.

The Canadian Bank of Commerce will erect a bank building here opposite the Windsor Hotel. The C. P. R. will construct a roundhouse here at a cost of $10,000

Merritt, B. C.

The Shawinigan Lake Lumber Company will erect here a large lumber mill during the ensuing year. Negotiations are in progress for the purchase of local timber limits.

Midland, Ont.

The Campbell Milling Company will erect their mill here to cost about $400,000, with capacity of 3,000 bbls. Contracts have not been let yet. Noted previously.

Milverton, Ont.

Tenders were called by Ranney Bros., until March 28th for erection of store and bank building here. Plans, etc., at Bank of Hamilton, Milverton.

Montreal, Que.

The carriage factory of Mr. A. C. Lariviere was destroyed by fire on the 21st inst. Estimated loss, about $30,000.

Messrs. MacVicar & Heriot, architects, are calling for tenders until March 29th for a three-storey addition to the Berliner-Gramophone factory in St. Henry ward. The three additional stories will be erected on the one-storey structure which constitutes the present factory.

New Westminster, B.C.

The Westminster Trust Company have had plans prepared for a ten-storey building to be erected at the corner of Begbie and Columbia streets. Six stories will be erected at this time and will be so built that the other four stories can be added when [illegible] demands it.

Peterborough, Ont.

The Electric Power Company will erect a car barn and extend the street railway to Byersville. J. H. Larmonth, general manager.

A by-law will be submitted shortly to the ratepayers in regard to the location here of the Independent Tire Company, Limited. The company agrees to erect a [illegible] brick or concrete building and machinery to the amount of $75,000 to be installed by July 1st, 1912.

Port Arthur, Ont.

Tenders addressed to the directors of the Finnish Publishing Company, Box 312, will be received until March 31st for erection of a building. Tenders may be separate for the material or for the work complete. Plans, etc., at office of J. Mannerstam, 204 Court street south.

Quebec, Que.

Mr. C. Moore, representative of the syndicate composed of American and Canadian capitalists, laid a proposition before the council regarding the erection of a hotel here.

Regina, Sask.

Tenders are called until April 1st for erection of office building for Credit Foncier Franco-Canadian. Storey & Van Egmond, architects.

The Saskatchewan Co-operative Company will erect a distributing warehouse in Regina in a short time. A. R. Partridge, president; A. Samson, secretary-manager; W. J. H. Traynor, general organizer.

Revelstoke, B.C.

F. C. Adams, Portland, Ore., and C. H. Danaher, Tacoma, Wash., are concerned in the project to exploit the pulpwood timber and water power resources of this city and district. Part of this projected work is the erection by the Diamond Sawmills Company of a mill at Big Eddy with a capacity of 200,000 feet a day and the acquisition of more than 500 miles of pulpwood and saw timber in the Columbia Valley. Other work proposed is a power plant by which the rapids of the Columbia will be harnessed and the erection of a pulp and paper mill, capable of turning out 200 tons of product per day.

Saskatoon, Sask.

Tenders are called for the six-storey Taylor department store. Cost, about $200,000. Storey & Van Egmond, architects. The latter are also advancing the plans for the proposed new business block on 2nd avenue, for which some changes will have to be made before tenders will be called.

Sherbrooke, Que.

The Quebec Central Railway Company will erect a large and modern office building on the site of their present offices. Mr. J. H. Walsh, General Manager.

St. Boniface, Man.

D. C. Cameron, president and managing director of the Rat Portage Lumber Company, laid before the council the project to expend about $250,000 along industrial lines and extensive building, in return for civic privileges named. Referred to committee.

St. Catharines, Ont.

The National Trust Company, Toronto, have purchased the block of land at the corner of Queen and St. Paul streets, on which a large modern building, 63 x 122 feet, will be erected.

Truro, N.S.

The Intercolonial freight shed at Truro was totally destroyed on the 23rd inst, entailing a loss of $47,000.

Toronto, Ont.

Moffatt and Irving, steel and iron firm, are trying to secure a five-acre site for a big steel and iron foundry in the Ashbridge's Bay district.

Messrs. Darling & Pearson are preparing plans for the new office building for the C. P. R. management. They show granite as the material for the lower stories.

Vancouver, B.C.

Permit was granted to D. Spencer & Co. for a 4-storey building at the rear of the Standard Furniture Co. block on Hastings street, $15,000.

Excavation has been started for the Bridge street branch of the Royal Bank of Canada. Jonathan Rogers has the contract. Estimated expenditure, $60,000. Previously noted.

H. K. Bamber, managing director, Associated Portland Cement Company, London, Eng., and H. D. Anderson, associate, are negotiating for a building site for the plant to be built here or in Victoria.

Messrs. McDonald & Wilson have the building permit for the tram terminal office block which will be erected for the B. C. E. R. Co., corner of Hastings and Carrall streets. The plans have been prepared by Mr. W. M. Sommerville and show a five-storey building. The estimated cost of the work is $350,000, and the contractors will start demolishing the old building in a few days.

Permit covering the erection of a brick warehouse at 1067 Hamilton street has been issued to A. O. Campbell, $48,000. McLachlan Bros. were also granted a permit to erect a warehouse at 1073 Hamilton street, $25,000.

Application was made for a permit for the erection of a $60,000 brick block on Granville street by Messrs. Boyle and Lewerke. The proposed building will be five stories in height and is to measure 50 by 120 feet.

Victoria, B.C.

T. Hooper, architect, is preparing plans for a 4-storey building for Messrs. Gault Bros., Limited, of Montreal. Estimated cost, $50,000.

Thos. Hooper, architect, called for tenders on March 23rd, for the erection and completion of a steel and reinforced concrete building for the B. C. Telephone Company, Limited, to be erected on the corner of Blanchard and Johnson streets.

Westmount, Que.

Permission to erect a factory on Hillside avenue was granted to Mr. Robert Neville.

Winnipeg, Man.

The plans for the addition of two new storeys for the union depot will be prepared shortly, it is expected.

Messrs. Brown & Vallance, Montreal, Que., report that tenders are being called for the Canadian Fairbanks Company's warehouse here.

Work on the building for the Confederation Life Association, will, it is thought, commence this spring. Details are not yet worked out definitely.

Tenders are called by C. P. R. management for construction of boiler shop, Winnipeg; and transfer table, Winnipeg shops. Plans, etc., at office of Frank Lee, division engineer.

The Canadian Pacific Telegraph Company is about to erect a large block for telegraph, ticket, freight, express and steamship offices. Address B. S. Jenkins, general Superintendent, Manitoba.

Tenders addressed to W. Wallace Blair, architect, 300 Nanton Bldg., will be received until March 29th for construction of two additional stories on the Notre Dame Block for the Ontario Manitoba and Western Land Co., Ltd.

AWARDED

Edmonton, Alta.

The contract for the new Tegler building, First and Elizabeth, has been awarded to Contractor Archibald, of Carberry, Manitoba, and construction is to be commenced early in April. H. A. Magoon, architect. The building is to be six stories in height, and will cost in the neighborhood of $125,000. The work must be finished by September 1st

Fort William, Ont.

George P. Grahame has been awarded the contract at $77,000 by Carl Wirth, t erect a block here for the Traders Ban of Canada.

Lethbridge, Alta.

The Lussier Construction Co. have secured the contract from the Henderso Estate for the erection of a brick bloc on the premises lately occupied by th Balmoral Hotel. The construction of th building without heating appliances an plumbing will cost about $21,000.

North Vancouver, B.C.

Messrs. Lett & Son are erecting a storey pressed brick block on Firs street. Bayness & Horell of Vancouve have the contract.

Ottawa, Ont.

Holbrook and Sutherland have bee awarded the contract for renovating an remodelling the Royal Bank on the co ner of Sparks and Elgin streets. Ke neth G. Rea, architect.

Regina, Sask.

A building permit was granted to K. McInnis & Sons for erection of t stores on Broad street. Henry Bla has the contract.

Welland, Cnt.

The contract for new Page & Hers plant at Welland was awarded to Da Dick & Sons, Limited, of Welland. T buildings when completed will be ov twice as large as present plant, and w be of steel, brick and concrete constru tion, the price is said to be $150,000. M D. Dick, Jr., president and managi director.

Winnipeg, Man.

A. Macdonald, wholesale grocer, h decided to rebuild his warehouse in Ma ket street, which was burned l Thanksgiving day. Saul & Irish are t contractors; permit called for an expe iture of $20,000.

Power Plants, Electricity and Telephones

Brandon, Man.
City Engineer Speakman has been instructed to prepare a plan of street railway which in his judgment would be the best paying route, and to report to the council. The line of railway will likely be about nine miles in all.

Dartmouth, N.S.
A company is seeking incorporation with a view to building an electric railway in Dartmouth out to Cow Bay. A. C. Pyke is interested. Robert Stanford, owner of Cow Bay Beach, is one of the incorporators.

Edmonton, Alta.
It was decided to pass a motion asking the Dominion Government to give the city time to submit a by-law to the people, before losing the period during which the contract may be considered.

Edmonton, Alta.
The council have considered the proposition of the Dominion government submitted to the city after application had been made for water power rights on the Athabasca river, the plan was favorably considered and the matter laid over till the next regular meeting. In connection with the government proposition, Cote & Nevelle sent in a communication involving a plan whereby a syndicate they represented would supply to the city from the same place on the Athabasca river where the city has taken rights. Under the terms of the government proposal the city is to start work next year at Grand Rapids by expending $100,000, and a like sum each year until 1916, when it would have to be in position to deliver 10,000 horse power in the city. It is also given the option of developing a maximum of 60,000 horse power. The syndicate represented by ote & Nevelle agreed to deliver 10,000 horse power to the city in five years providing the city surrender its rights secured by application to the Dominion government, and contract to take 10,000 horse power per year from the syndicate The terms upon which it agrees to do this are: Over its own transmission lines it will agree to deliver 10,000 horse power in the city for $24.85 per horse power per annum; 20,000 horse power at $18 per h.p. per annum; 30,000 h.p. at $15 per h.p. per annum. In case the ity builds its own transmission line, the estimated cost of which engineer eville said was $800,000, then they would supply power at the following figures: 10,000 h.p. at $15 per h.p. per annum; 20,000 h.p. at $12 per h.p., and 30,000 h.p. at $10 per h.p.

Fort William, Ont.
The commissioners of the joint street railway board seem to be in favor of having the car works established here. ommissioner Fortune submitted a report on the plant which he proposed should be built by the city.

Hamilton, Ont.
The board of control recommended the city council to engage E. J. Sifton, of Vancouver, the electrical expert, to report for Hamilton on the cost of a municipal lighting, power and street lighting system. There were forty applications from experts all over Canada and the United States.

Peterborough, Ont.
See "Business Buildings."

Pense, Sask.
Bids will be received until noon, April 1, by F. R. Groves, secretary, for the construction of a telephone system, complete, for the Rufus Rural Telephone Company.

Revelstoke, B.C.
A company known as the Dominion Securities has been organized and it is reported that a franchise for a street railway has been guaranteed.

Regina, Sask.
Tenders addressed to the City Commissioners will be received until April 5th for the construction of about 7 miles of street railway track laying, consisting of ordinary construction and track laying in pavements. Information obtained from L. A. Thornton, city engineer. Advertisement in "Tenders and For Sale department" of this issue.

St. John, N.B.
A bill before the legislature introduced by J. E. Wilson, M.P.P., seeks the incorporation of a company to harness the Lepreaux river and generate electric power for transmission to St. John, the company to be known as the New Brunswick Hydro-Electric Power Company. Incorporators, C. H. Easson, manager, Bank of Nova Scotia, St. John; W. E. Foster and Percy W. Thomson, St. John, and H. H. Beck, Toronto. Capital, $1,500,000.

Toronto, Ont.
Tenders are called until March 30th for pole line supplies. W. C. Norman, clerk, Eglinton.

Vancouver, B.C.
The Vancouver Gas Co. is having plans prepared for two producers and storage tanks to cost between $400,000 and $500,000.

Victoria, B.C.
See "Business Buildings."

Welland, Ont.
The Niagara Falls, Welland and Lake Erie Railway Company have obtained their charter. The company's charter from the town requires the construction to start before May 15th. C. J. Laughlin is interested. Geo. H. Carpenter, Cleveland, Ohio, is financing.

AWARDED

Calgary, Alta.
Tenders for the city's supply of wire for the coming season has been awarded to the Canada General Electric and General Supplies, Limited. Their tenders were the same: For No. 8 to 4-0, $17.20 per hundred; and for No. 10, $1[illegible]20

Fort William, Ont.
W. L. Bird, manager and secretary of the Kaministwkia Power Company Limited, writes that contracts in connection with the extension of power plant at Kakabeka Falls have been awarded as follows: John Inglis, Toronto, penstocks; waterwheels, J. M. Voith, gen- Canada General Electric, electrical equipment, Steel Company of Canada copper wire. Estimated cost, $200,000

Sherbrooke, Que.
The Canadian Westinghouse Company, of Hamilton, has the contract to install the civic lighting plant here. The contract is worth about $40,000.

Strathcona, Alta.
The city council adopted a report from the power house committee recommending the acceptance of various tenders for the supply of $45,031 worth of electrical machinery to be installed by October next in the municipal power house. The tenders accepted were 600 kw. generator to Chapman Walker, Toronto, $10,160; Burnham regulator, Gorman Clancey & Grindley, Edmonton, $750; generator engine, Goldie & McCulloch, Galt, $12,900; 2,500 h.p. boilers, Goldie & McCulloch, $12,750; smoke stacks, fans, etc., Canada Foundry Company, Toronto, $7,304; 2 feed pumps, etc., Canada Foundry Company, $1,167. The machinery will double the present electrical generating capacity of the city power plant and is urgently needed.

Miscellaneous

Edmonton, Alta.
Tenders are called by the City Commissioners until April 3rd for supply of spruce lumber. Information at the Stores and Works Department, Kinistino avenue.

Lachine, Que.
Tenders addressed to H. Robert, secretary-treasurer, will be received until April 4th for supply of cement, hard crush stone, size 1½-in., 1-in. and ¼-in., delivered f.o.b. Lachine, for the supply of coarse river sand, pit sand and cinders, to be delivered on canal bank, and for supply of unbroken stone, blue or grey to be delivered when required. For information apply to V. H. Dupont, civil engineer, 62 St. James street, Montreal

London, Ont.
Tenders addressed to H. Ashplant, Chairman No. 3 Committee, will be received until April 3rd for new watering carts and repairs to old carts. Specifications, etc., at office of the acting City Engineer, Geo. W. Wright.

Montreal, Que.
Three important building permits were granted at the city hall. One was to Messrs. A. Ramsay and Sons to erect a new manufacturing establishment on St. Paul street, near their present site at a cost of $16,000. The building will be of concrete, six storeys high. Y. M C. A. officials have secured a permit to build a power house near their new Drummond street building, $15,500.

Tenders addressed to David Seath, secretary, Harbor Commissioners, will be received until April 4th for supply of the following: ballast stone, concrete stone, Portland cement, rails, sand, steel bars, yellow pine timber. Specifications upon application to F. W. Cowie, chief engineer.

Ottawa, Ont.
Further supplementary estimates for the year include Port Arthur and Fort William, harbor and river improvements [illegible] Harbour, Ont., improvements, $111,300

Renfrew, Ont.
Tenders are called until April 10th for supply of Portland cement, 2,500 bbls more or less. Cement to meet the standard specifications of the Canadian Society of Civil Engineers. A. T. Lawson, town clerk, treasurer

Toronto, Ont.
Tenders in connection with the erection of East Toronto Fire Hall will be

(Continued on page 57)

Tenders and For Sale Department

City of Moose Jaw, Saskatchewan

Main Drainage Works

Sealed tenders endorsed "Tender A" and "Tender B" will be received by the undersigned [illegible] until 8.30 o'clock p.m., on Monday, April 10th, 1911.

Any tender received after the above stated time will be declared informal.

Contract "A."

Supplying material for and constructing a Sewage Disposal Plant complete, including Pump House, Sedimentation Tanks and Percolating Filter, also the supply of materials for and the laying of a Trunk Sewer and Water Main.

Contract "B."

Supplying two Electrically Driven Centrifugal Pumps and Auto Starters complete with all piping, connections, etc.

Plans and specifications for Contract "A" may be obtained from the City Engineer, Moose Jaw, upon receipt of a marked cheque for the sum of $25 to be held until the return of plans and specifications, and for Contract "B" plans and specifications will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON,
City Engineer.
W. F. HEAL,
City Clerk.
Moose Jaw, Feb. 18th, 1911. 9-14

City of Moose Jaw, Saskatchewan

SEWER AND WATER EXTENSIONS

Sealed tenders endorsed "Tender 28," "Tender 29," "Tender 30" and "Tender 31," will be received by the undersigned City Clerk until 8.30 o'clock p.m. on **Monday, April 10th, 1911.**

Any tender received after the above stated time will be declared informal.

Contract 28.—The laying of approximately 30,700 lin. feet of tile pipe sewer, building manholes, etc.

The laying of approximately 29,700 lineal feet of cast iron water main, placing valves, valve boxes, hydrants, etc.

Contract 29.—The supplying of approximately:
29,600 lineal feet of 6-in. c.i. water pipe.
112 lineal feet of 4-in. c.i. water pipe.
132 6-in. cast iron reverse curves.
34 6-in. cast iron crosses.
72 6-in. cast iron tees.
29 4-in. off 6-in. cast iron tees.
28 4-in. cast iron tees.
95 6-in. cast iron plugs.

Contract 30.—The supply of approximately:
28,000 lin. feet of 6-in. vitrified tile sewer pipe.
26,000 lin. feet of 8-in. vitrified tile sewer pipe
5,225 lin. ft. of 10-in. vitrified tile sewer pipe.
1,100 lin. ft. of 12-in. vitrified tile sewer pipe.
25 8-in. tees.
75 6-in. tees.
25 8-in. ¼ bends.
100 6-in. ⅛ bends.
25 8-in. stops.
25 10-in. stops.
400 4-in. to 6-in. increasers.

..**Contract 31.**—The supply of approximately:
65 6-in. 3-way hydrants.
147 6-in. gate valves.
29 4-in. gate valves.
150 6-in. valve boxes.
29 4-in. valve boxes.
88 manholes, frames and covers.

Plans and specifications for Contract 28 may be seen at the office of the City Engineer, Moose Jaw, and at the offices of the Canadian Engineer at Toronto and Winnipeg.

Plans and specifications for Contracts 29, 30, and 31 will be sent upon request.

The lowest or any tender not necessarily accepted.

J. M. WILSON,
City Engineer.
W. F. HEAL,
City Clerk.
Moose Jaw, Feb. 24, 1911. 9-14

Steam Shovels

We own and have for sale near Buffalo, N.Y., two Vulcan 75-ton 2½-yard steam shovels; late model, with new extra large boilers and in excellent condition; also one 70-ton. These will stand most rigid inspection and we are offering them at unusually low prices. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle Street,
T.F. Chicago, Ill.

Sealed Tenders

will be received until **Monday noon, April 3rd,** for the construction, delivery and erection in place in Welland, Ont., of one unit of water power driven waterworks pumps, three million imperial gallons daily capacity, including turbine, pipes, valves, etc.

Specifications, prepared by Mr. Wm. Kennedy, Jr., Engineer, Montreal, may be obtained from the undersigned.

Envelopes to be marked "Tenders for Pumps."

R. COOPER,
Chairman Water Commissioners.
11-13 Welland, Ont.

To Contractors

Tenders will be received at the Office of the Secretary, School of Mining, Kingston, up to 6 p.m., of **Saturday, April 1st,** for the Cabinet Work, comprising Tables, Benches, Fume Cupboards, and other Furniture, and also Plumbing and Fitters' Works required in the completion of the Chemistry Building for the Governors of the School of Mining.

Plans and specifications may be seen at the office of the undersigned.

The lowest or any tender not necessarily accepted.

POWER & SON,
Architects.
Merchants' Bank Chambers,
Kingston, Ont. 12-13

Tenders for Swiss Chalets at Golden, B.C.

for the

Canadian Pacific Railway Co.

Sealed tenders are invited for the erection of six chalets of Swiss design at the C. P. R. Swiss Village "Edelweiss," near Golden, B.C.

Plans and specifications may be obtained on application to the undersigned. All applications must be accompanied by a certified cheque for $10, which will be returned on the receipt of bona fide tender and the return of the plans and specifications.

Tenders are to be delivered not later than 9 a.m. on **Saturady, April 1st, 1911,** addressed to

J. S. DENNIS,
Manager Irrigation, Alberta and B.C. Lands,
Canadian Pacific Railway Company,
Calgary, Alberta.

The lowest or any tender not necessarily accepted. 12-13

To Architects

Competitive Plans

The Municipal Council of the Town of Goderich is desirous of obtaining plans for a proposed new municipal building (combined Town Hall and Fire Hall) to be erected on the site of the present Town Hall.

Conditions of competition can be had on application to the undersigned.

Plans will be received up to and including **April 15th, 1911.**

L. L. KNOX, Town Clerk,
11-13 Goderich, Ont.

Bridge Tenders

Sealed tenders addressed to the Chairman, Board of Works, Owen Sound, will be received up till 6 p.m., **Friday, April 7th, 1911,** for the following:

1. **9th Street Bridge—**
   (a) Steel superstructure, span 53 ft., width 40 ft.
   (b) Reinforced concrete floor for same.
   (c) Concrete abutments for same.
   (d) Reinforced concrete arch, span 50 ft., width 40 ft.
2. **10th Street Bridge—**
   (a) Steel superstructure, span 69 ft., width 66 ft.
   (b) Reinforced concrete floor for same.
   (c) Concrete abutments for same.
   (d) Reinforced concrete arch, span 66 feet width 66 feet.
3. Removal of old bridge and construction o temporary one.

A certified bank cheque payable to the Trea surer of the Town of Owen Sound for 5 pe cent. shall accompany each tender, to be returne in case of non-acceptance, and to be forfeited i case the accepted tenderer declines the contrac or fails in the performance thereof.

Plans and specifications may be seen at th office of the Town Engineer.

Tenderers for steel superstructure to submi plans and strain sheets.

The lowest or any tender not necessaril accepted.

J. K. LESLIE,
Chairman Board of Works.
R. McDOWALL, C.E.,
Town Enginee
Owen Sound, March 7. 1911. 11-1

City of Prince Albert

Tenders for

Intercepting Sewe

Sealed tenders addressed to the Commissione of the City of Prince Albert and marked "Tend for Sewer," will be received until noon on **Satu day, the 15th day of April, 1911,** for the constru tion of a Main Intercepting Sewer, as follow
5,749 lin. ft. 4-ft. 6in. x 3 ft. concrete sewer.
4,640 lin. ft. 4-ft. 3-in. x 2-ft. 10-in. concre sewer.
2,798 lin. ft. 4-ft. x 2-ft. 8-in. concrete sew
19 Manholes.

Alternate bids for Reinforced Concrete Pipe w be considered.

Plans and specifications may be obtained the office of the City Engineer.

A marked cheque for $2.500, in favor of Treasurer of the City of Prince Albert must company each tender submitted.

ANDREW HOLMES.
C. O. DAVIDSON, Commissioners
F. A. CREIGHTON,

Prince Albert, Sask.,
March 7, 1911. 11

For Sale

The Board of Power and Light Commissioners of Ingersoll, Ont., have for sale for immediate shipment, two 25 h.p. Induction motors, C. G. E. 3-phase, 220 volts, 4 Canadian General transformers, each 15 k.w. capacity, 2,200-220 volts, 60 cycles, S. P. direct current Arc Lamps, direct current motors, 220 and 110 volts from 1 to 40 h.p., and for delivery within a few weeks, steam engines, boilers and general steam plant accessories. Particulars on application.

W. R. REYNOLDS,
Superintendent.
11-13

Harriston Water Works

Tenders will be received until **April 13th next** for

CAST IRON PIPE, HYDRANTS, VALVES, LEAD, WATER TOWER.

For all information apply to

BOWMAN & CONNOR,
Consulting Engineers,
Berlin, Ont.
13-13

Tender for Sewer

Town of Walkerville

Sealed tenders will be received, by registered letters, addressed to the undersigned up to noon on **Tuesday, the 11th day of April, 1911,** for the construction of a Brick Sewer on Victoria Road from Huron street south to Ontario street in the Town of Walkerville.

Plans and specifications may be seen on application to Mr. Owen McKay, C.E., Walkerville.

Tenders must be accompanied by a marked cheque, made payable to the Town Treasurer, equal to 5 per cent. of the amount thereof.

Should any party whose tender is accepted, fail to execute the necessary Contract Bond for the due fulfillment of the same, his deposit will be forfeited to the Town.

Deposits of unsuccessful tenderers will be returned.

The lowest tender not necessarily accepted.

The names of two responsible persons must accompany each tender.

CECIL H. ROBINSON,
Walkerville, Ont., Town Clerk.
March 21, 1911 13-13

Town of Oakville

Waterworks Extensions

Notice to Contractors

Sealed tenders will be received by the Chairman of the Board of Water and Light Commissioners until 8 p.m., **Wednesday, April 5th, 1911,** for the following work:

Contract A. Labor for pipe laying.

Contract D. Furnishing cast iron pipe and specials.

Contract E. Furnishing fire hydrants, valves, etc.

Plans and specifications may be seen at the office of the engineers, 204 Mail Building, Toronto. No tender necessarily accepted.

C. G. MARLATT, Chairman.
GEO. HILLMER, Mayor.
P. A. BATH, Commissioner.
(Board of Water and Light Commissioners)
13-13 CHIPMAN & POWER, Engineers.

Tenders for Scow

Tenders will be received, addressed to the undersigned, for the furnishing of all materials, construction, painting and caulking for a scow at Blue Lake, Ontario, to be built of Georgia pine or British Columbia fir. Scow to contain a hoisting engine and digging machine, estimated weight 40 tons.

Size of scow to be 60 feet x 30 feet x 5 feet 3 inches over all and having 3 spuds 30 feet long.

Parties tendering will give a detail specification of what they purpose to supply as being proper and sufficient, and give all details, tracings, etc., and also state earliest date they would guarantee completion.

The lowest or any tender not necessarily accepted.

The Ontario Portland Cement Co., Ltd.,
13-13 Brantford, Ont.

BOARD OF EDUCATION

Tenders Wanted

Sealed tenders, addressed to the Secretary-Treasurer of the Board, will be received until **Friday Noon, March 31st, 1911,** for the several trades required in the erection of new school on Caledonia Road.

Plans and specifications may be seen and all information obtained at the office of the Board, City Hall. Each tender must be accompanied by the deposit mentioned in the said specifications and forms of tender. The lowest or any tender will not necessarily be accepted.

W. W. HODGSON,
Chairman of Committee.
W. C. WILKINSON,
13-13 Secretary-Treasurer.

City of Toronto

Tenders Wanted for

Construction Equipment

Separate or bulk tenders, on prescribed forms, will be received, by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, April 11th, 1911,** for the delivery of the following:—

(1) Two (2) full circle swing traction steam shovels, one and a quarter (1¼) yard dipper.

(2) Six (6) saddle tank locomotives, 36-in. gauge.

(3) Forty (40) four yard (4 yd.) dump cars, or fifty-four (54) three yard (3 yd.) dump cars, 36-in. gauge.

(4) Four (4) double truck flat cars, 36-in. gauge.

(5) (a) Two hundred (200 tons 30-lb. steel rail.

(b) Twenty-four (24) No. 5 switch leads.

(c) Seventy-five (75) kegs of spikes.

(d) Eighteen hundred (1800) pair of angle plates.

(e) Twenty (20) kegs bolts and nuts.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and form of tender may be obtained upon application from Department of Railways, Bridges and Docks, City Engineer's Office, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman, Board of Control.
City Hall, Toronto,
March 27th, 1911 13-13

The City of Regina

Street Railway Construction

Sealed tenders marked "Tenders for Street Railway Construction" will be received by the City Commissioners until 12 noon, **April 5th, 1911,** for the construction of approximately 7 miles of Street Railway Track Laying, consisting of ordinary construction, and track laying in pavements.

Full particulars may be had upon application to the City Engineer.

A marked cheque covering 5 per cent. of the amount of the bid must accompany each tender.

The lowest or any tender not necessarily accepted.

(Signed) L. A. THORNTON,
13-13 City Engineer.

Miscellaneous

(Continued from page 55)

received until April 11th for the following: concrete paving, hardware, stable fittings. Plans, etc., with City Architect.

The time for receiving tenders for wiring Exhibition Building is extended until April 11th. G. R. Geary, Chairman Board of Control.

Recent building permits include: W. H. Merritt, 2½ storey brick dwelling, East Roxboro street, $5,000; W. H. Merritt, 2½-storey brick dwelling, East Roxboro street, $5,000; A. & A. Grant, 1 pr. semi- det. 2-storey brick dwellings, Logan avenue, $5,000; F. T. Proctor, 2-storey brick dwelling, west side Spadina road, $7,000; Rankin & Son, 2½-storey brick dwelling Westminster avenue, $4,000; J. Castleman, 2 pr. semi-det. 2-storey and attic brick dwellings, on Willoughby avenue, $10,000; E. G. McBride, 1 pr. semi-det. 2-storey and attic brick dwellings, 62-64 Wheeler avenue, $4,600; Philo Lamb, altering printing office to hotel, cor. Yonge and Adelaide streets, $15,000; Jas. Kyle, 3 det. 2-storey and attic brick dwellings, on east side Triller avenue, $6,000; John Price, 1 pr. semi-det. 2-storey and attic brick dwellings, on Greenwood avenue, $4,600; J. H. McBrien, 2-storey and attic brick dwelling, 33 Castle Frank road, $4,500; Geo. E. Case, 9 pr. semi-det. 2-storey and attic brick dwellings, Western and Humberside, $50,000; Hugh Munro, 3 att. 2-storey stucco dwellings, brick fronts, on Tiverton, $4,200; D. H. Farrow, 2-storey attic brick dwelling, Russell Hill Road, $8,000; Houghton & Breeze, 2-storey brick store and dwelling, and 2-storey brick dwelling attached, cor. Dufferin and Lappin, $5,000; R. C. Vaughan, 3 att. 2-storey brick dwellings Shirley street, $4,500; Mrs. A. F. Lambert, 2-storey brick dwelling, north side Glendowynne, $4,300; Chas. Smedley, 2-storey brick dwelling, Summerhill avenue, $4,000; G. K. Halladay, 2-storey brick apartments, near King on east side Dunn, $5,500; Clare & Edmonds, 3 pr. semi-det. 2-storey brick dwellings, on southeast cor. Perth and Ernest, $12,000; E. P. Atkinson, 2½-storey brick dwelling, 11 High Park Boulevard, $6,000; Crossley & Hunter, 2-storey and attic brick dwelling, 510 Palmerston Boulevard, $4,700; A. Nelson, 2 pr. semi-det. 2-storey and attic brick dwellings, near Hepbourne on west side Dovercourt, $16,000; Wilkins & Co., 10 pr. semi-det. 2½-storey brick dwellings on southeast cor. Bedford and Dupont, $10,000; H. E. Squires, 1 pr. semi-det. 2-storey and attic brick dwellings, 288-288½ Major street; C. E. Pickard, 2½-storey brick dwelling, near [illegible] on south side Lonsdale, $4,200; J. F. Gladwell, 1 pr. semi-det. and 1 pr. 2-storey roughcast dwellings, brick fronts, near Danforth on Logan avenue, $5,100; J. C. Wilgar, 2½-storey brick dwelling, near Indian road on High Park Boulevard, $7,000; A. P. Cranfield, 6 pr. semi-det. 2-storey brick dwellings, near Davenport on east side Symington, $19,600; Sheahan & Rostron, 1 pr. semi-det. 2-storey brick dwellings, 91-93 Ritchie avenue, $4,000; Wm. Long, 2-storey and attic brick dwelling, near Indian road on High Park Gardens, $8,000; R. W. Harrison, 1 pr. semi-det. 2-storey brick dwellings, near Brock on Delaney, $5,000; Ontario Dock Co., dock, at foot of York street, $6,000; Quebec Bank, 4-storey brick bank building on south side King near Jordan, $50,000; H. P. Baird, 3 att. 2-storey brick stores and dwellings, near Fern on east side Roncesvalles, $6,000; H. C. Schofield, 2-storey and attic brick dwelling, near Roxborough on Highlands, $26,250; Thompson & Mitchell, 1 pr. semi-det. 2-storey and attic brick dwellings, near Harbord on west side Montrose, $5,500; D. Weismiller, 2-storey brick dwelling, cor. Dowling & King, $6,000; Samuel Frame, 1 pr. semi-det. 2½-storey brick dwellings on Roncesvalles, $5,000; John Bell, 2 det. 2-storey brick dwellings, near Mavety on Hillsview, $4,000; W. Dunseath, 1 pr. semi-det. 2-storey and attic brick dwellings, on Shaw street, $6,600; E. A. Lock, 2½-storey brick dwelling on Lyndhurst, [illegible] L. & J. Hulme, 3 att. 2-storey roughcast dwellings, brick fronts, on Ashdale avenue, $4,800; Toronto General Hospital, chimney, corner Elizabeth and Christopher streets, $7,900; W. F. Thompson, 2½-storey brick dwelling and a garage, 80 Woodlawn avenue, $6,000; Thos. Painter, 3 att. 2½-storey brick dwellings, 325-7-9 Huron street, $8,000; Don Rowing Club, 2-storey frame club house, foot of Morley avenue, $7,000; Mr. McBain, 1 pr. semi-det. 2-storey brick dwellings, west side Ellerbeck, $4,000; Wm. & A. Hutchins, 2-storey brick apartments, 93-95 Dowling avenue; Davidson & Co., 3 att. 2½-storey brick dwellings, Crawford street, $6,000; A. & J. Dyce, 3 pr. semi-det. 2-storey brick dwellings, on Campbell avenue, $12,000; John Maguire, 4 pr. semi-det. 2-storey brick dwellings, cor. Spadina and Bridman, $15,000; J. J. Walsh, 2½-storey brick apartments, northwest cor. King and Close ave., $20,000; L. C. Sheppard, 3 att. 2½-storey brick dwellings, near King on Massey, $6,000; W. G. Smith, addition to store and dwelling, cor. College and Clinton, $4,000; R. C. Roundell, 1 pr. semi-det. 2-storey brick dwellings, Symington avenue, $4,000; F. R. Snow, 2-storey brick dwellings on west side Strachan avenue, $8,000; John M. Walkey, 2 pr. semi-det. 2-storey brick dwellings on east side Shaw street, $7,000; A. Duff, 1 pr. semi-det. 2-storey brick dwellings, on Columbus, $5,000; W. H. Benson, 2 pr. semi-det. 2-storey brick dwellings, on Booth avenue, $7,200; R. A. Shields, 1 pr. semi-det. 2-storey brick dwellings, on Alvin avenue, $4,200; D. A. Eagle & G. F. Smith, 3 pr. semi-det. 2-storey brick dwellings, on Bloomfield avenue, $12,000; Cairo Bros., 3-storey brick store and dwelling, corner of Queen street west, $6,000; C. E. Walton, 1 pr. semi-det. 2-storey brick stores and dwellings on south side Gerrard, $7,000; M. P. Warren, 3-storey brick warehouse on King street, $12,000; A. J. Savage, 2½-storey brick dwelling, near Glen road, $6,500; J. G Shackleton, 1 pr. semi-det. 2-storey brick dwellings, on Heward, $4,800; J. N. Hoare, 2½-storey brick dwellings on Glen road, $6,500; Geo. Aikins, 2½-storey brick dwelling, near Broadview, $4,000; W. A. Forster, 2 det. 2-storey and attic brick dwellings, 22 and 28 Gloucester, $6,000; J. W. Young, 3 pr. semi-det. 2-storey brick dwellings, Westmoreland, $10,000; H. Talbot, 4 att, 2-storey and attic brick dwellings, 68 Hayden street, $11,000; D. Hornell, 1 pr. semi-det. 2½-storey brick dwellings, on Harcourt, $4,600; J. J. Downey, 1 pr. semi-det. 2-storey brick dwellings, on north side Humberside, $4,800; C. R. Peterkin, 2-storey and attic brick dwelling, on Oakmount road, $4,500; Peter Griffin, 2 pr. semi-det. 2-storey brick dwellings, 662-8 Lansdowne, $7,200; Geo. Nicholson, 2 pr. semi-det. 2-storey brick dwellings, on north side Gerrard, $10,000;J. T. Turner, 3 pr. semi-det. and 1 det. 2-storey roughcast dwellings, on Sarah, $8,400; Chas. Soules, 3 pr. semi-det. 2-storey brick dwellings, on Strathcona avenue, $11,800; A. A. Kennedy, 3 pr. semi-det. 2-storey brick dwellings, southwest cor. Spadina and Davenport roads, $12,000; Thompson & Mitchell, 1 pr. semi-det. 2-storey and attic brick dwellings, on Montrose, $5,500; Wm. A. Hart, Jr., 3-storey brick apartments, 1251 King street west, $14,000; Coltman & Pearson, 2 det. 2-storey and attic brick dwellings, 172-4 Sunnyside, $9,000; H. Bine, 1 pr. semi-det. 2-storey brick dwellings, on Wallace, $5,000; Government of Canada, alterations to examining warehouse, cor. Yonge and Esplanade, $16,000 O. Millar, alterations to hotel on St. Patrick square and Queen, $5,000; L. E. Phillips, 4 det. 1½-storey brick veneer dwellings, on Norton, $7,200; Jas. Sargeant, 2-storey brick dwelling, on Perth avenue, $4,000.

Tenders will be shortly called by the new directors of the Northern Navigation Company for a new steamer larger and faster than the Hamonic for service on the upper lakes, to cost about $600,000. H. H. Gildersleeve, manager; Jas. Playfair, Midland, president of Inland Lines.

Vancouver, B.C.

The City Electrician is preparing plans for the installation of a modern fire and police alarm and signal system; also for red lights to be placed over each fire alarm box.

Welland, Ont.

Tenders addressed to L. K. Jones, secretary, Department of Railways and Canals, Ottawa, will be received until April 6th for supply, etc., of various articles of timber, hardware, castings, oils, etc., for use on the Welland canal and its branches for the year 1911-1912. Specifications obtained from the purchasing agent of the above department.

Winnipeg, Man.

The board of control is advertising for tenders for a gasoline or steam traction engine to haul supply power to the "link belt" mixer, the big machine to make the ingredients which go to make what is known in Winnipeg as asphalt-macadam.

Recent building permits include: Two dwellings on the south side of Beresford avenue, between John and Helen, owner J. L. Scott, value $4,200; one dwelling on the south side of Arnold avenue, between Mabel and Fisher, owner K. Creelman, value $2,200; one dwelling on the south side of Oakwood avenue, owner R. C. Mitchell, value $4,500; one dwelling on Maplewood avenue, owner R. C. Mitchell, value $3,500; Axebride & Markel, 2 dwellings, Arnold avenue, $4,000; city of Winnipeg patrol and signal stations, Rupert avenue, $62,711; R. Robson, 3 dwellings, Home street, $15,000; R. Bray, dwelling, Alfred avenue, $5,000; R. Taylor, dwelling, Dorchester avenue, $6,000; P. Olson, dwelling, Home street, $2,500; Petursson & Thornsteinsson, apartment block, west side of Agnes street, between Ellice and Sargent, $50,000; H. Johnaneson, dwelling, Lipton street, $2,200; W. J. McLaughlin, two dwellings, Beresford avenue, $4,400; B. C. Andrews, dwelling, Walnut street, $3,000; E. W. Andrews, dwelling, Grosvenor avenue, $8,000; H. Birkhill, dwelling, Ingersoll avenue, $2,200; Winnipeg Electric Railway Company, pavilion, River Park, $11,750; Wallace & Akins, dwelling, Westminster avenue, $4,800; C. E. Foster, dwelling, Jubilee avenue, $2,500; J. A. M. Aikens, dwelling, Langside street, $15,000; Mrs. Diner, terrace 5 stores; Henry avenue, $25,000; Ed. Moe, four dwellings, Rosser avenue, $12,000; a factory for the Perfection Concrete Company, $8,000; a terrace of five stores on Pembina street, to be built for H. J. Smith, $15,000; an apartment building on the north side of Spadina avenue, for H. Gesner, $25,000; a store and warehouse to be built on Salter street, for M. Calof, 531 Selkirk avenue, $14,000; ten dwellings to be built on the north side of Jubilee avenue for H. H. Cottingham, $26,000; J. J. Bergman, 226 Agnes street, dwelling on Telfer streeet, $4,000; Dunn and Wallace, dwelling on Rosedale, $3,500; D. H. Mather, garage and improvement to dwelling, Evergreen place, $7,000.

AWARDED

Calgary, Alta.

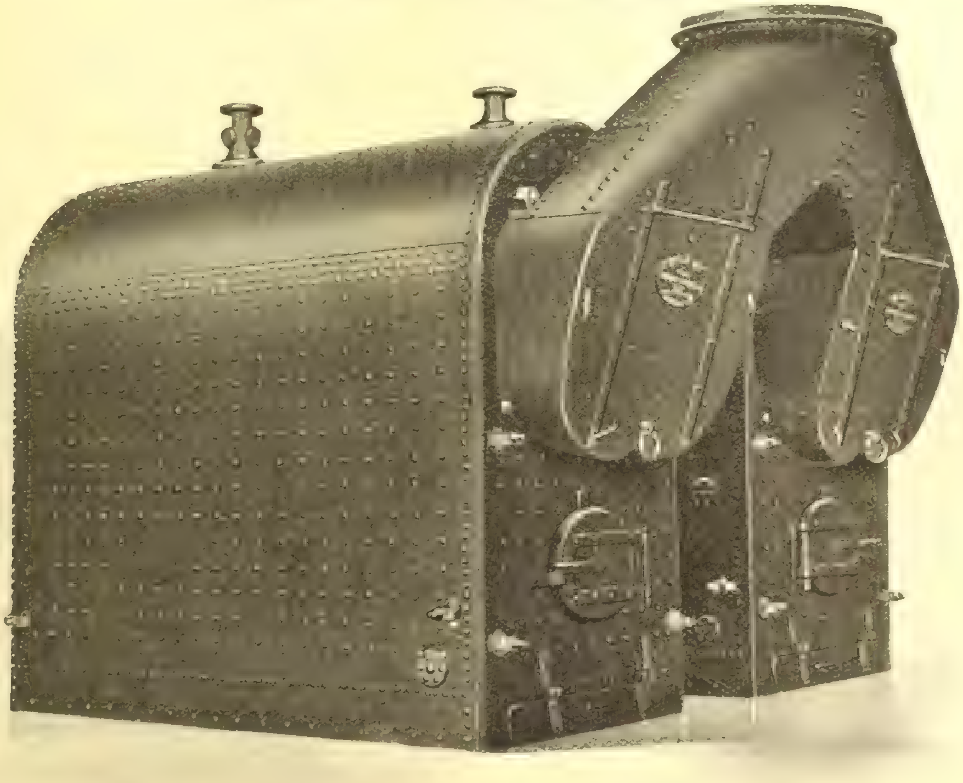
Mr. T. H. Goodman has just let contracts to MacKissock and Thomas, of Winnipeg and Calgary, for a residence in Crescentwood to cost about $15,000, and for other work amounting to $30,000.

Espanola, Ont.

The directors of the Spanish River Pulp and Paper Company recently awarded the contract for their new million dollar news plant at Espanola. The contract for two 164 inch paper machines went to Pusey & Jones, of Wilmington, Del. They will be of 55 tons per day capacity each. The contract for eight beaters went to the Waterous Engine Works, at Brantford, Ont. The Westinghouse Company, of Hamilton, gets the contract for the generators, and the Robb Engineering Company, of Windsor, N.S., the boilers. Work on the new plant will be started as soon as the frost is out of the ground, and it is expected that the machinery will be installed by December 1 of the present year. The building will be of concrete and brick, so constructed as to permit at any future time the doubling of the mill's capacity without difficulty. The company decided to carry out the work themselves. They also decided not to proceed with the erection of a sulphite mill for the present.

The John Inglis Company

Engineers and Boilermakers Limited



Fitzgibbon Type of Boilers built for McLachlin Bros., Arnprior, Ont.

BOILERS

Water Tube (Vertical and Horizontal)

Return Tubular

Fitzgibbon

Locomotive

Scotch Dry Back

Scotch Marine

Vertical Submerged Tube

Sole Canadian
Manufacturers of
Erie City Water Tube
Boilers

Let us submit you prices, photos, &c.

14 Strachan Ave., TORONTO, Canada

WHEN YOU THINK OF METAL CEILING THINK OF "GALT"

"Galt" Art Metal Ceilings are sold strictly on their merits, their **mechanical superiority** and faithfulness to art in styles they typify.

Machine-cut beads (patented process) make them easy to apply. Plates snap into place and seams fit snugly together. Why waste your time puttying and peening the joints on old-fashioned stuff when the new is here and costs less?

Write us about your Metal Ceiling work

THE GALT ART METAL CO.,
GALT - ONT.

Another reason for the remarkable Herringbone demand.

Herringbone Lath has the Best Key

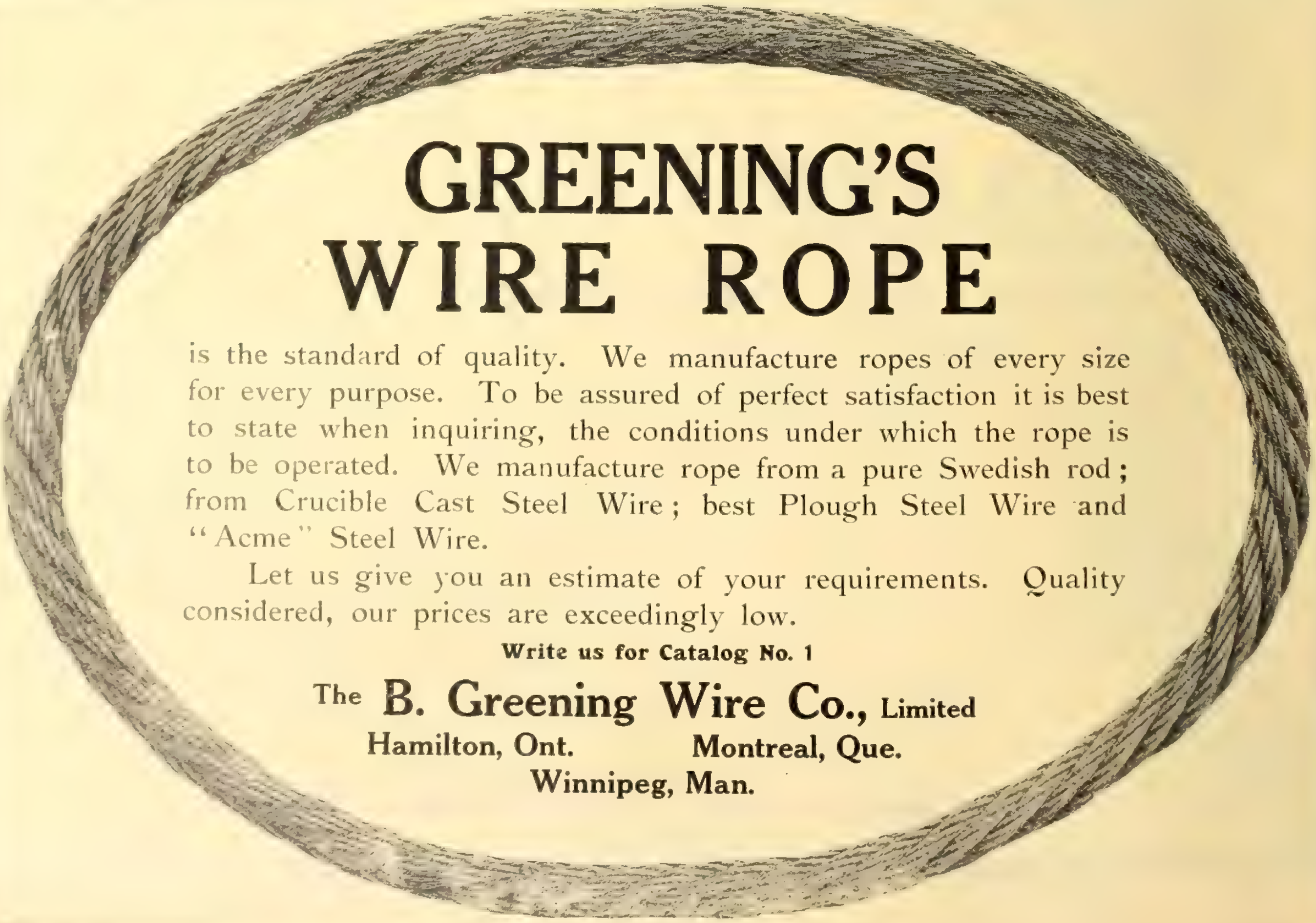
THIS OR THIS

Something of a stunt for wet mortar.

The Herringbone Ribs, seen from the back of the lath are shelves. The clinch rests securely here. Instead of dropping, it tightly seals in the filaments.

Perfect Key means Never Cracking Plaster

CLARENCE W. NOBLE
GENERAL SALES AGENT
117 HOME LIFE BUILDING - TORONTO, ONT.
The Metal Shingle & Siding Co., Manufacturers



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Let us give you an estimate of your requirements. Quality considered, our prices are exceedingly low.

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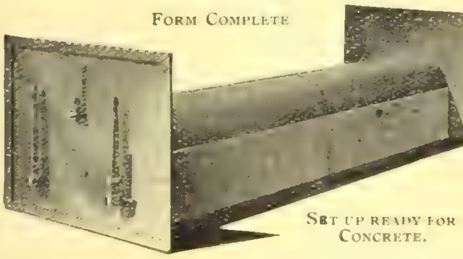
For the Building of

Culverts, Conduits, Small Bridges, Sewers, Etc.



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Successor to Collapsible Steel Form Co.

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—The Philosopher of Metal Town.

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"Metallic"

Ceilings and Walls

When your specifications read "Metallic Ceilings and Walls", you are doing more than simply erecting a building — you are insuring **absolute satisfaction** for all parties concerned.

"Metallic" Ceilings and Walls are made of superior quality sheet steel—fit accurately, are durable and never sag, crack or fall off.

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Manufacturers 1952

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3 K.W. Hours on Switchboard for One Cent

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Suitable for Public and Private Buildings

The Mirrlees-Diesel Crude Oil Engine

uses "Fuel," "Gas" or "Residual" Oil

No Ignition Gear
No Producer
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No Vapourizer
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Self Contained

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Cheaper Buildings and Foundations
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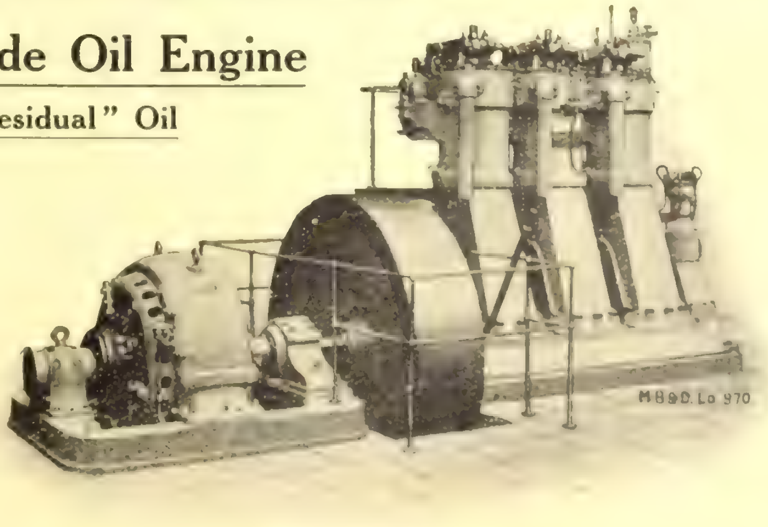
No Standby Losses



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A few dollars spent in advertising your proposals in

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would result in additional competition, which might save your city or town or your client many hundreds of dollars.

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Birch, Mahogany, Plain Oak, Quartered Oak, Cypress, etc.

Sash, Doors, Porch Columns, Store Fronts, Mouldings, etc.

S. Anglin & Company
Manufacturers of Fine Woodwork
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"The best is cheapest"

"Sanorto"

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Guaranteed durable, jointless, noiseless; fire, water, insect and dust proof
For Churches, Hospitals, Hotels and all public buildings it is unequalled. Its use in private houses for bath rooms, kitchens, verandahs, etc, has always given the greatest satisfaction.
Our imitation marble is perfect. Testimonials on application Estimates on all classes of work free. Distance no object. Write for samples

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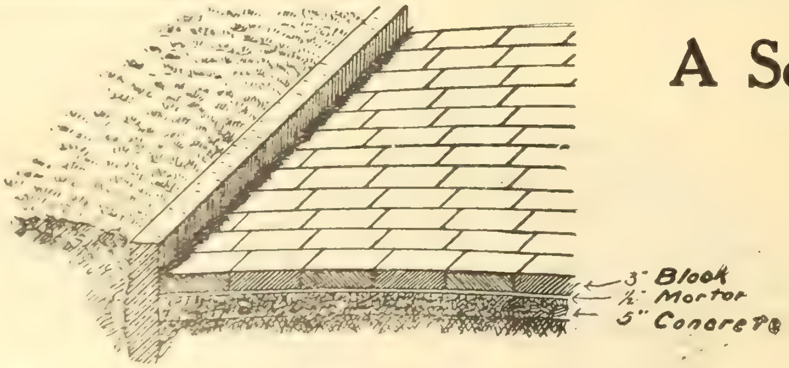

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Durable and Non-Abrasive.
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These requirements are met by

Asphalt Block Pavements
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The Ontario Asphalt Block Company, Limited - Windsor, Ont.

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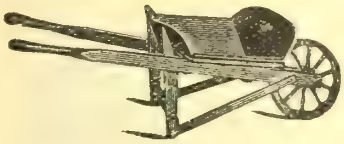
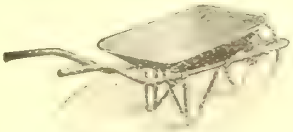
Manufacturers of



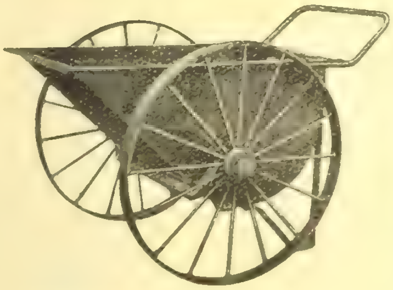
Wheelbarrows of every description, for every purpose. If it is a Wheelbarrow you want we have it in Railroad or Navvy, Steel Tray or all Steel, Garden or Lawn.



Wheel Scrapers, pressed bowl or square box in two sizes Nos. 2 and 3.

Drag Scrapers, pressed steel handles on top or sides, with or without runners.

Ox Shovels, Fresno or **Buck Scrapers**



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Trucks, Bag, Warehouse, Platform

Sterling line of Roller Bearing easy pushing Concrete Wheelbarrows and Carts

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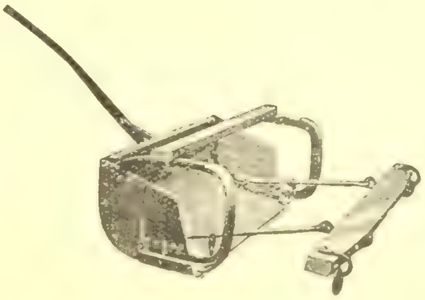

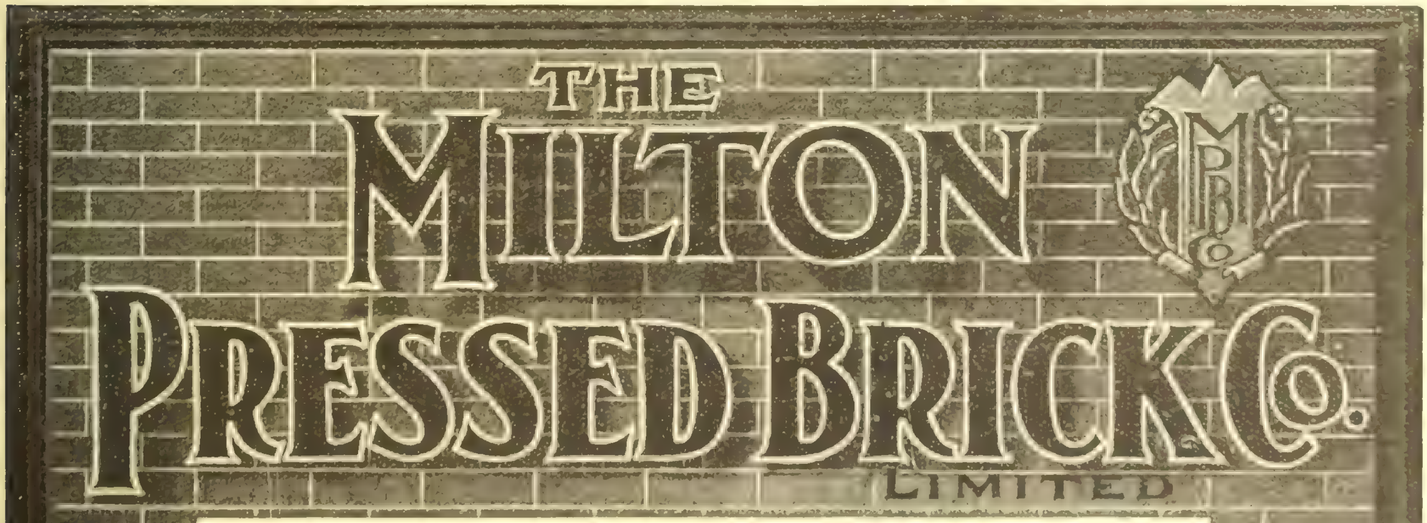

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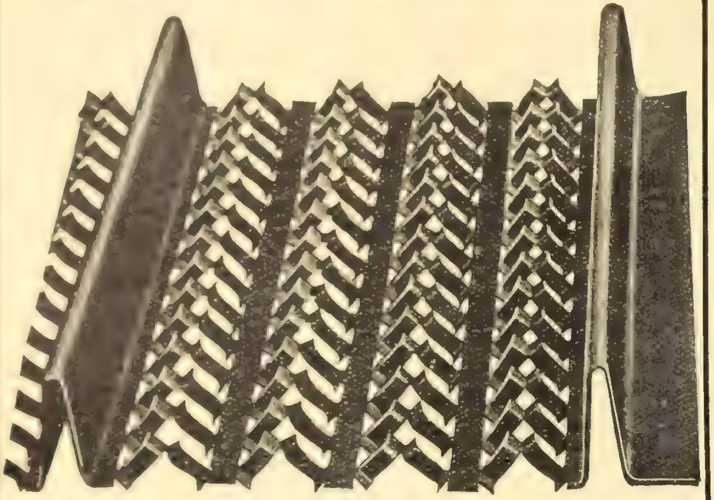
Combination of metal lath and channel in one sheet. Does away with expensive wiring and studding, also Form work when used as reinforcement for floor or roof slab.



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Head Office:	Branches:	Agencies:
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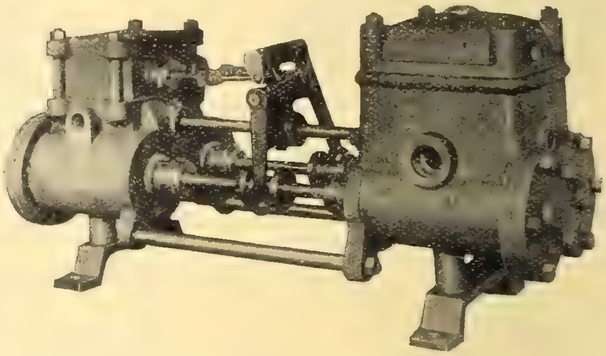
We manufacture a large line of pumping machinery for special and general service.



The above illustrates the Martin Standard Duplex Pump for boiler feeding and general service. They are specially designed for work where the requirements do not exceed a working pressure of 150 pounds per square inch.

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in use at Plant of Lawrence Cement
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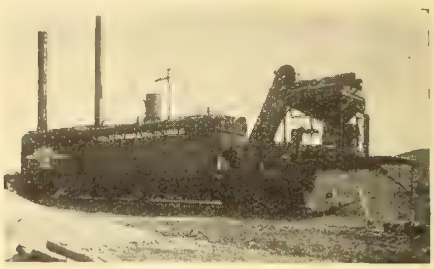
The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.



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Highway Bridge and Concrete Work.

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That means more satisfaction and better goods for your customers at the same money.

Their satisfaction means trade insurance—A permanent clientele for you.

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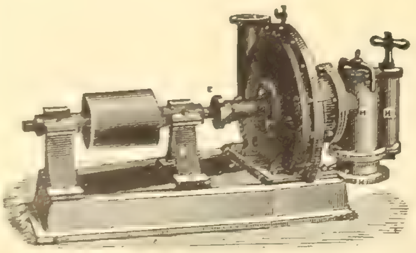

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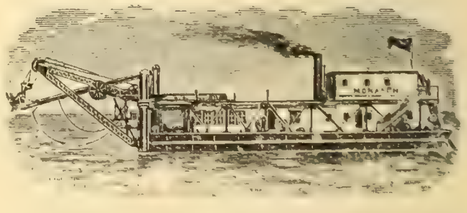

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Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.

Sizes 3 to 42' Diameter up to ½" in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

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55,000 cu. yds. of Concrete

placed in the foundation of the Municipal Building, New York City.

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This bucket gave complete satisfaction.

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"Your bucket in every way has given perfect satisfaction; it is all that the word 'Acme' implies; in my eighteen years experience I have used no better."

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(Signed)
Supt. Construction
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Just listen to the wonderful advantages of incorporating in your concrete

Guelph Hydrated Lime

1—The concrete works easier under the trowel.
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The above are not five fancy ideas but five established facts.

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Standard White Lime Co.
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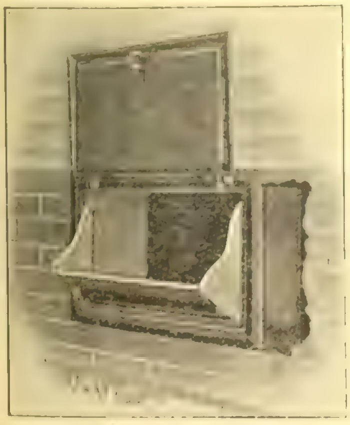
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EQUIP YOUR CELLAR

with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

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All sizes for Concrete, Road Work, and Sidewalks

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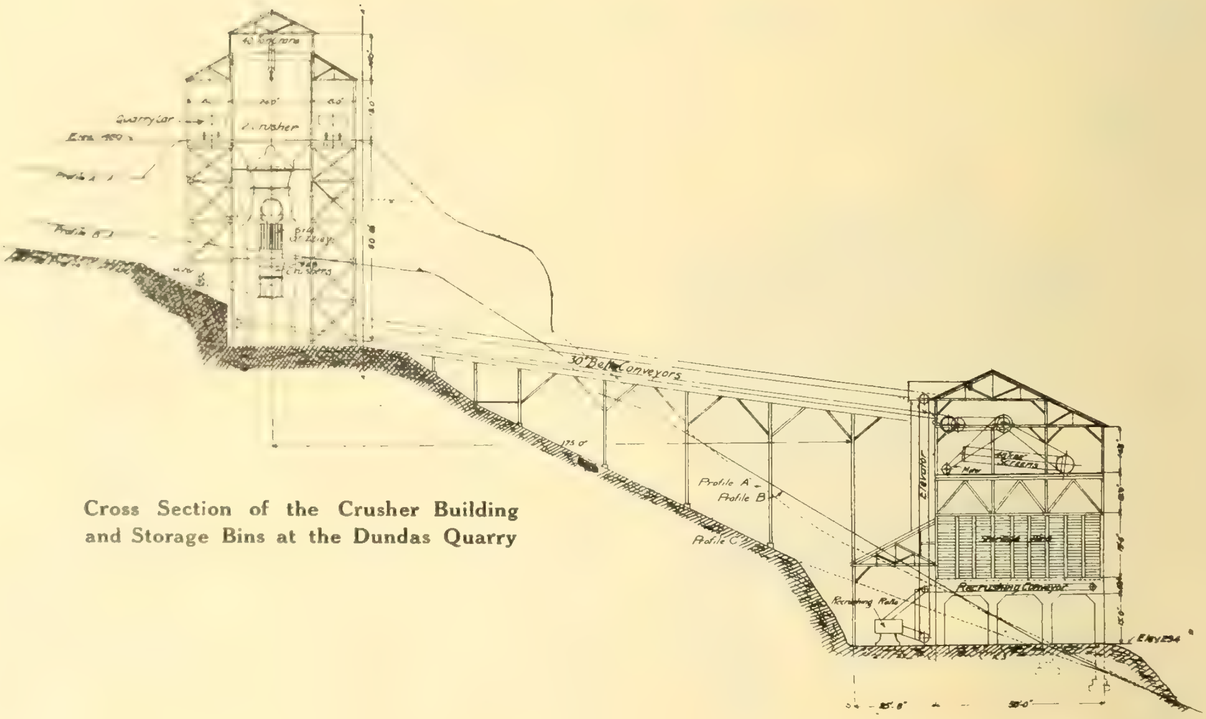

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With a bin capacity of 3000 tons we can insure all our customers prompt delivery.

Write or wire for quotations.

Doolittle & Wilcox, Limited

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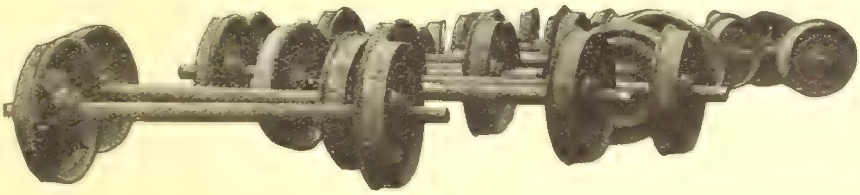

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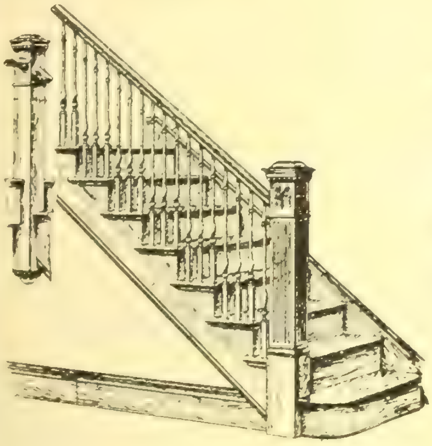

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Our knowledge and experience in stair building enables us to turn out this class of work and give the utmost satisfaction.

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The Perfect Brick Machine

Patented in Canada
is what its name implies "Perfect"

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From the earliest dawn of time,
Many a city has grown great,
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Built with Lime and Stone and Sweat,
Roman walls enduring yet
Advertise down to all time,
What you **can** do with **good** lime

You can build it still today,
Build as well and strong as they,
Build in this or any clime
If you build with **Renfrew Lime.**

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Fire-Bricks have been proved to be the most perfect brick on the market.

They withstand the highest heats without melting; changes of temperature without expansion or contraction and the consequent splitting-up, and keep the iron free from fire-brick in forging.

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Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

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James Robertson Co. Ltd.	St. John, N. B.
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Walker & Barnes	Edmonton, Alta.
The Ritchie Contracting & Supply Co. Ltd.	Vancouver, B. C.
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The kind that don't sag and warp

We have equipped our factory with the latest door making Machinery and are able to turn out doors not only of the best quality but at the right price.

Prompt Deliveries **Write for prices**

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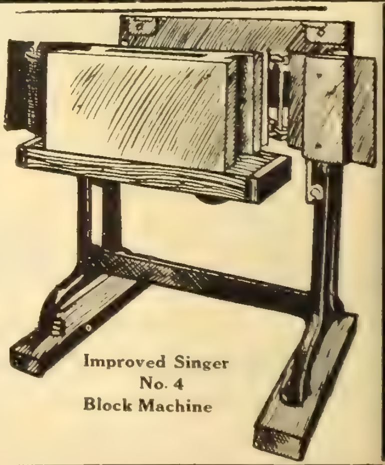
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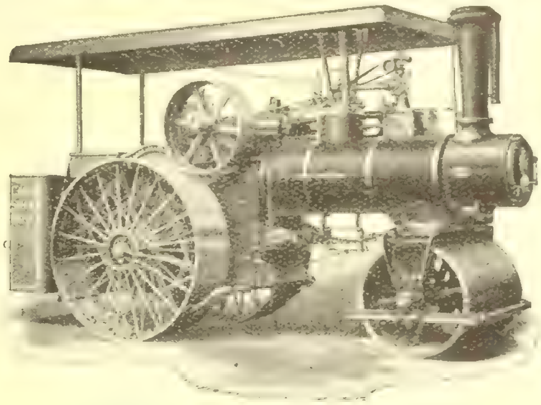

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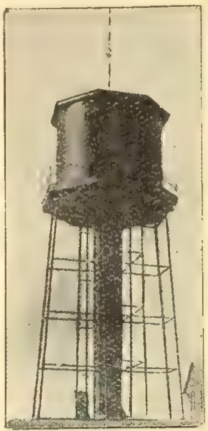

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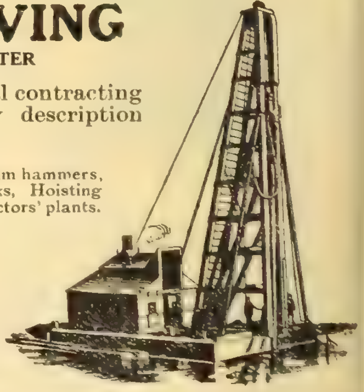

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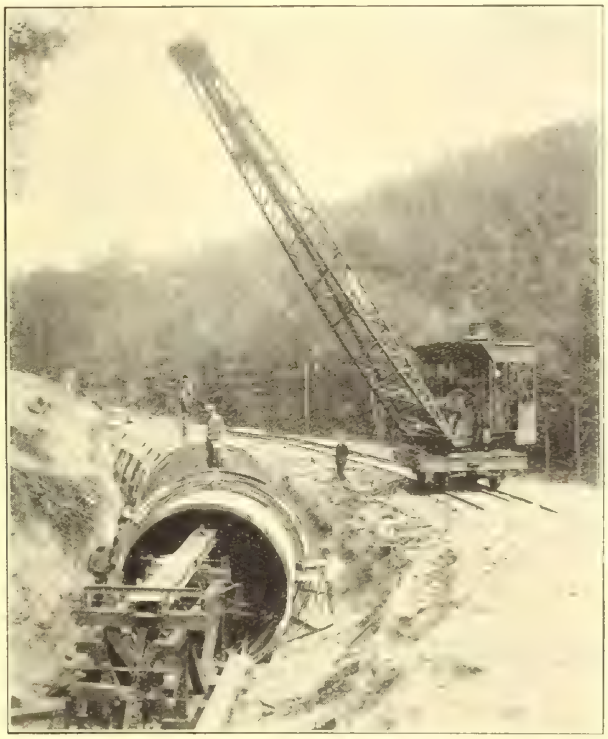

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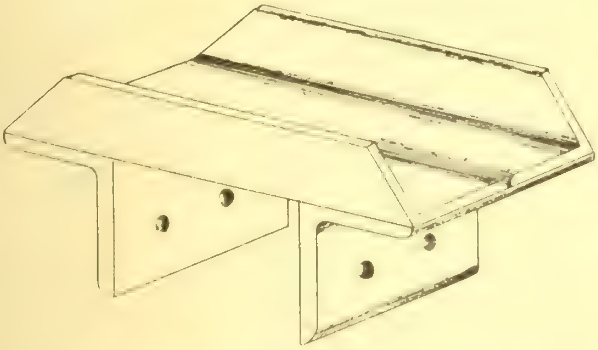

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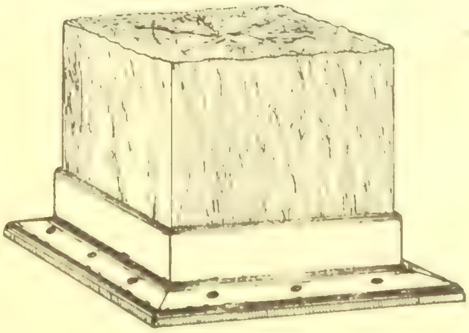

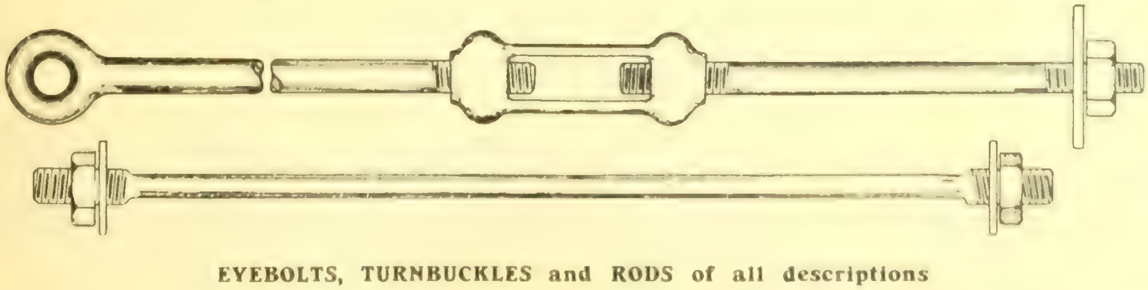

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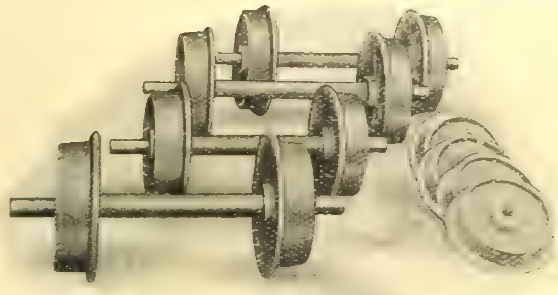

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50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
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Lead pipe, 80 per cent. off; lead waste, 80 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

Soil Pipe and Fittings.

Medium and extra heavy pipe and fittings, up to 6-inch, 75 per cent.

7 and 8-inch pipe, 50 per cent.

Light pipe, 60 per cent.; fittings, 70 and 10 per cent.

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Cement, barrel lots, in bags, delivered, Toronto, bags extra, $1.90.

Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.70.

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Burnt River rubble stone delivered, $15 to $16 per toise.

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Brown coursing stone, delivered, $3.25 to $3.50 per yard.

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Brown sills and beads, in the rough, delivered, 40 cents per foot.

Rubble stone in car lots, $1.30 per ton.

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Steel channels and beams, $2.60 per 100 pounds, delivered f.o.b. Toronto.

Expanded Metal, No. 10 gauge, 3½ cents per square foot.

Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

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Pure White Lead, ground in oil, $6.25 to $6.50 per 100 lbs.

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Pure Florence Green, ground in oil, $13 to $14 per 100 lbs.

Boiled Linseed Oil, in barrels, $1.23 per gallon lon of 9 lbs.

Raw Linseed Oil, in barrels, $1.12 per gallon of 9 lbs.

Turpentine, in barrels, $1.20 per gallon.

Pure Linseed Oil Putty, 25-lb. tins, $4.00 per 100 lbs.

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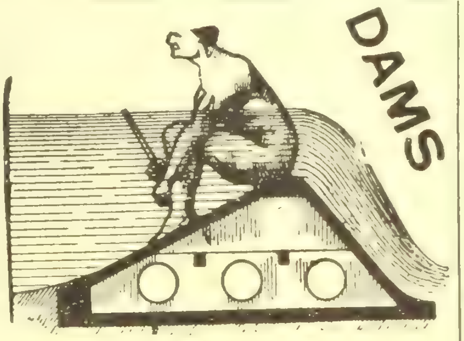

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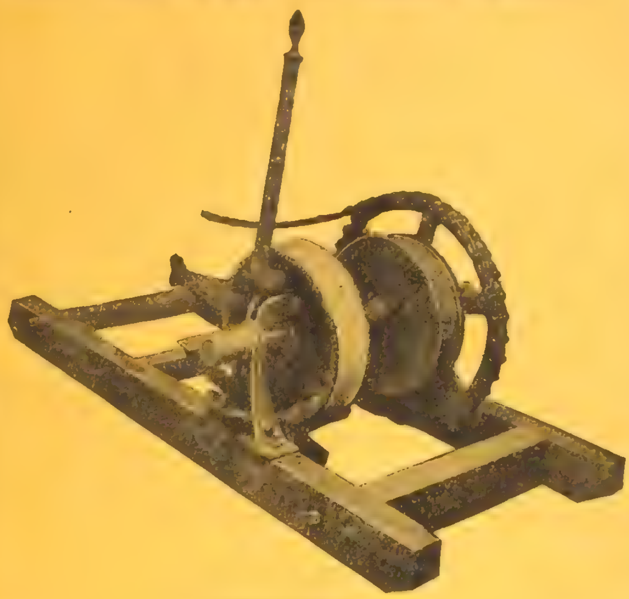

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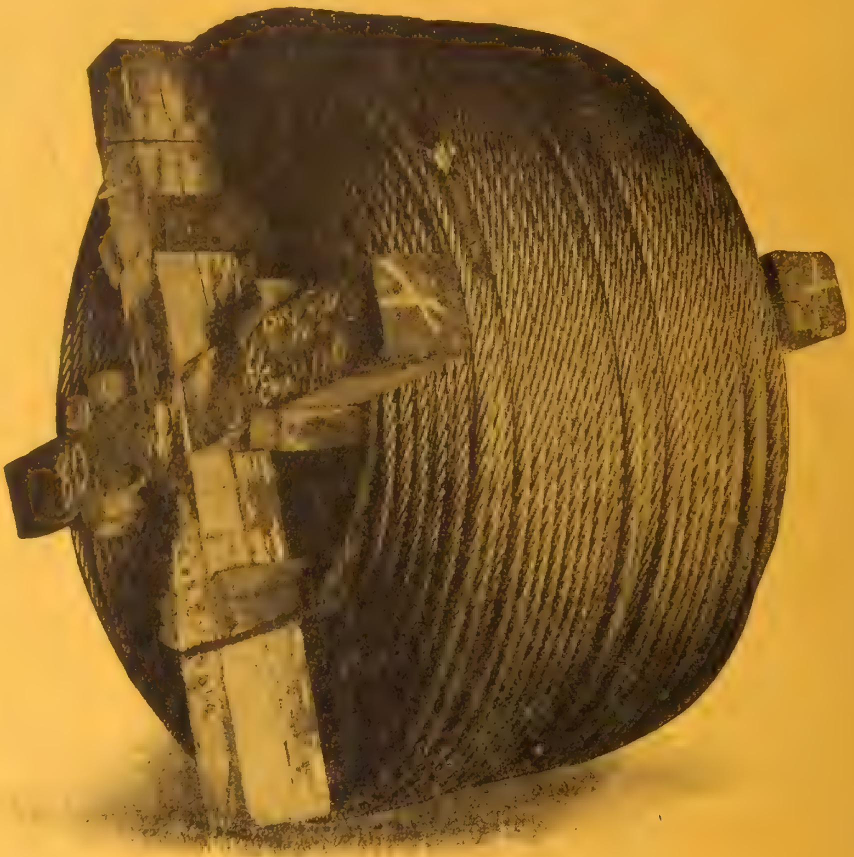

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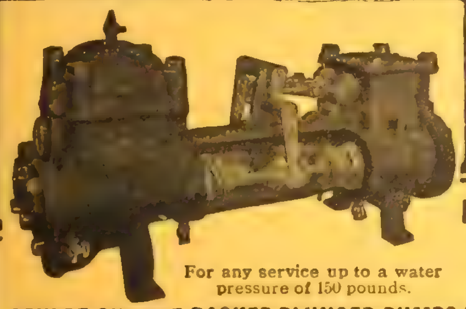

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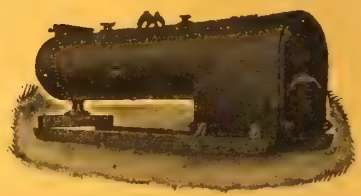

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Now it will be readily understood

that out of the mass of enquiries that come to us, there are a number that include questions as to what might be termed Allied Industries. These we now answer to the best of our ability, but we could answer them still more satisfactorily, if manufacturers of materials used in conjunction with cement would co-operate to the extent of sending copies of their catalogues and other literature to be placed on file in our office for reference.

We should like to obtain

the names and addresses, together with catalogues, and any other obtainable information of manufacturers of and dealers in:

1. **Concrete Machinery**
2. **Building Blocks**
3. **Cement Bricks**
4. **Tile Molds**
5. **Fence Posts**
6. **Re-inforcing Material**
7. **Water-proofing Compounds**

It is not alone for our own convenience that we make this suggestion ; firms who manufacture or deal in such articles will find it to their own advantage to have this information in the hands of our Information Department, thereby enabling us to hand on to them from time to time enquiries for such materials as they severally make.

In sending catalogues, literature or information, please address same to "Sales Department."

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No. 1025—45-ton Bucyrus Steam Shovel, 1½ yard dipper.
No. 1049—35-ton Little Giant Steam Shovel, 1¼ yd. dip.
No. 1176—70-ton 2½ yards Bucyrus Steam Shovel.
No. 1177—70-ton 2½ yards Bucyrus Steam Shovel.

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No. 1050—One "Davenport" Locomotive, saddle tank, 36-in. gauge, 16 tons.
No. 1051—One "Porter" Locomotive, saddle tank, 36-in. gauge, 10 tons.
No. 1052—One "Kingston" Locomotive, saddle tank, 36-in. gauge, 16 tons.
No. 1115—One "Kingston" Locomotive, saddle tank, 42-in. gauge, 16 tons.
No. 1178—Two "Porter" Locomotives, saddle tank, 36-in. gauge, 18 tons.
No. 1179—Two "Porter" Locomotives, saddle tank, 36-in. gauge, 18 tons.
No. 1180—One "Davenport" Locomotive, saddle tank, 36-in. gauge, 12 tons.

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No. 1053—15 Dump Cars, 3-yard capacity, 3-foot gauge, one way dump.
No. 1054—15 Dump Cars, 3-yard capacity, 3-foot gauge, two way dump.
No. 1118—25 Dump Cars, 2-yard capacity, 3ft. 6in. gauge, two way dump.
No. 1127—92 Dump Cars, 5-yard capacity, standard gauge, "Austin."
No. 1169—10 Dump Cars, ¾-yard capacity, 2-foot gauge, "Koppel."
No. 1181—60 Dump Cars, 4-yard capacity, 3-foot gauge, "Western" and "Continental."
No. 1182—3 Dump Cars, 3-yard capacity, 3-foot gauge,
No. 1189—12 Dump Cars, 6-yard capacity, standard gauge, "Continental."

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No. 274 —No. 0 Smith Mixer on skids with driving pulley.
No. 944 —No. 1 Smith Mixer on trucks with gasoline eng.
No. 1192—No. 0 Smith Mixer on trucks, with engine and boiler.
No. 1077—No. 5 Smith Mixer on skids.
No. 1088—No. 1 Smith Mixer on trucks, with engine and boiler.
No. 1104—No. 0 Smith mixer on trucks, with engine and boiler.
No. 1114—No. 2½ Smith Mixer on trucks, with engine and boiler.
No. 1128—No. 1 Smith Mixer with gasoline engine.
No. 1137—One Hanes Mixer.
No. 1166—2 No. 4 Ransome Mixers on skids with engine and measuring hopper.

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No. 663 —No. 4 10 x 18 Austin Jaw Crusher on wheels.
No. 1079—No. 2 Austin Gyratory Crusher on truck with 14-ft. elevator and chute screen.
No. 1096—No. 6 Austin Gyratory Crusher.
No. 1122—One Blake-Marsden Stone Breaker, 1½-in. throw.
No. 1173—No. 3 Austin Gyratory Crusher with 30-ft. elevator and screen.

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No. 1165—One 30 h.p. Vertical Boiler, 9 x 4, with stack and fittings.

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No. 1168—Four Stuebner and similar type bottom dumping buckets.

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No. 1138—One 18-in. direct connected Centrifugal Pump.

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No. 1184—Two Goulds 8 x 6 direct connected Centrifugal Pumps.

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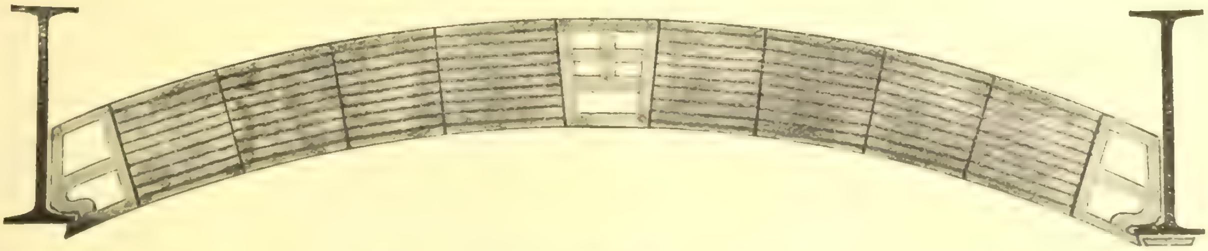

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Facilities	Our mills are thoroughly equipped and have an ample capacity and good storage, which enables us to ship all orders promptly. They are so distributed as to have every advantage of railway and water connection. We are particularly well situated to supply Ontario and Western Canada.
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Tests	Throughout the entire manufacture of our cement the greatest care is exercised to keep the product at its high standard. The care exercised in this regard has created a reputation for reliability among the users of cement who do not have the time or opportunity to test each shipment, and who consequently rely largely upon the manufacturer.
Adaptability	Our cement is adapted for all purposes where high grade cement is desired, such as in foundations for buildings and heavy machinery, tunnel work, cisterns, cellar floors, sidewalks, pavements, curbing, artificial stone, conduits, sewers, reservoirs, bridge piers and concrete work of all kinds.
Information	Architects and Engineers will be assisted with any information desired and we will co-operate in making any tests of our cement on request.

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Limited
28 King Street West, TORONTO, CAN.

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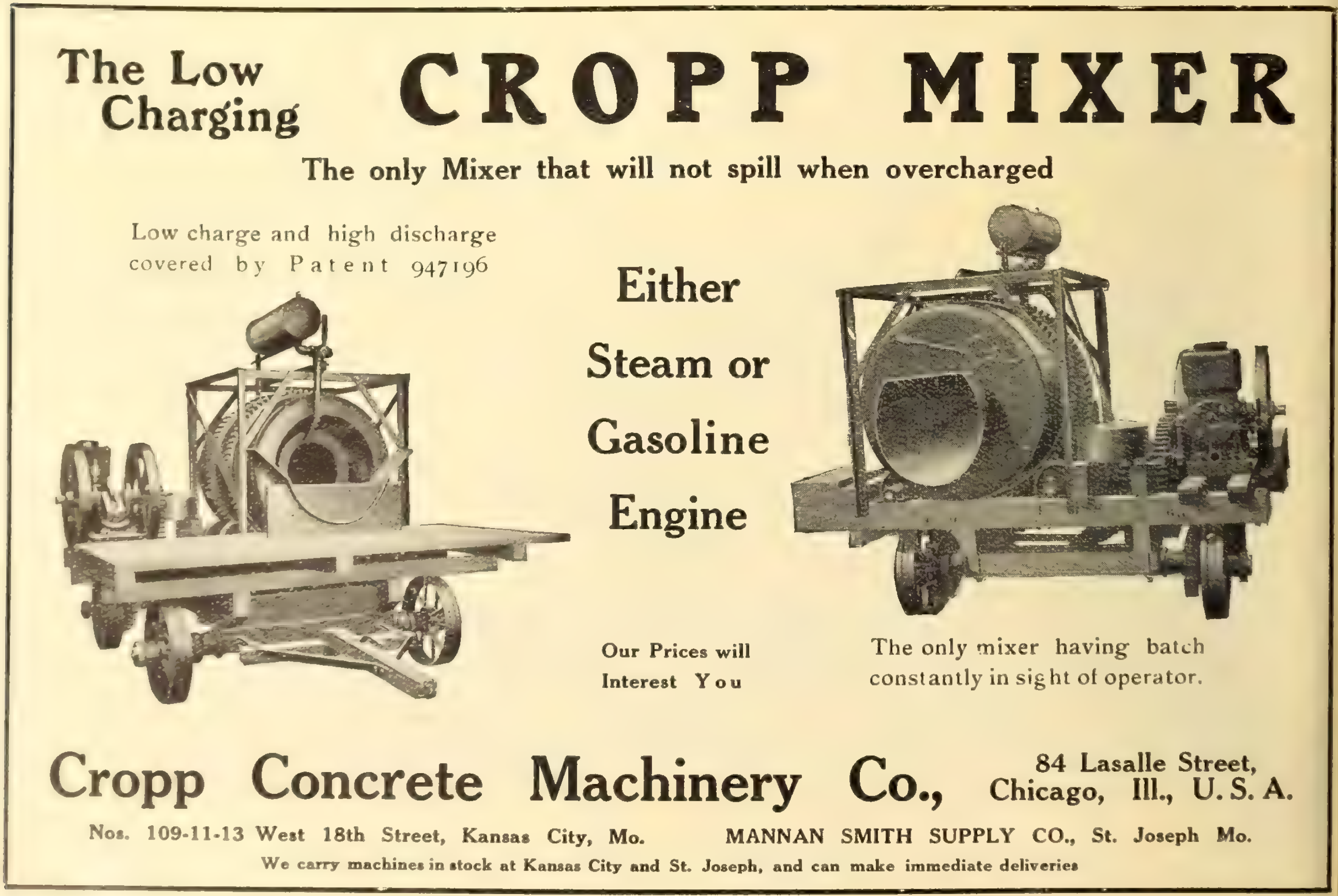

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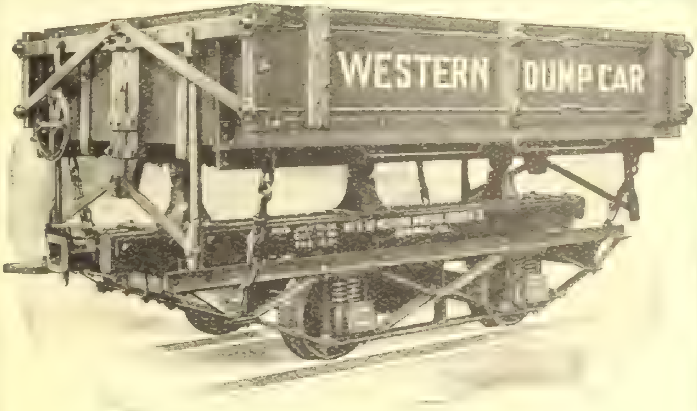

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is ideal size for 3-ft. gauge. It is unbeatable in design and construction—ample capacity for heavy loads, yet of low, compact form, with bed and truck separable, steep dumping angle and automatic pivoted side boards. It is dependable in **any** service.

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Span, 870 feet. Working Load [illegible]
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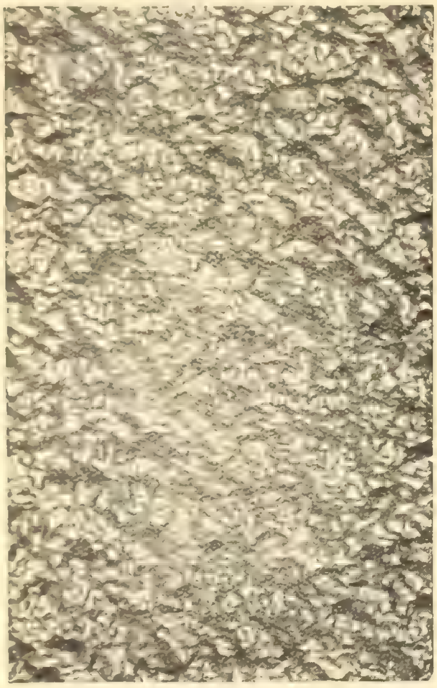
Chance's Figured Rolled Glass

has a smooth and bright surface for cutting, and a deep, sharply defined pattern which gives it a peculiar brilliancy. It cuts easier and looks better than other makes.



Chances Figured Rolled Pattern G
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Chance's Figured Rolled Glass is made in white, blue, green, wine and amber, and in a great variety of patterns. "Pattern G," illustrated here, is a favorite with many architects.

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Among the samples you will find glass suited for your very best work, and moderate in price. Write for them now.

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Start Right

by specifying Hamilton Pressed Brick for every job where a clean, smooth and distinctive effect is desired.

Hamilton Pressed Brick is made from shale, not clay, rich in Iron Oxide free from so called Soda. Besides furnishing this high class product we can fill your orders promptly. Connections with T. H. B., C. P. R., G. T. R., M. C. R.

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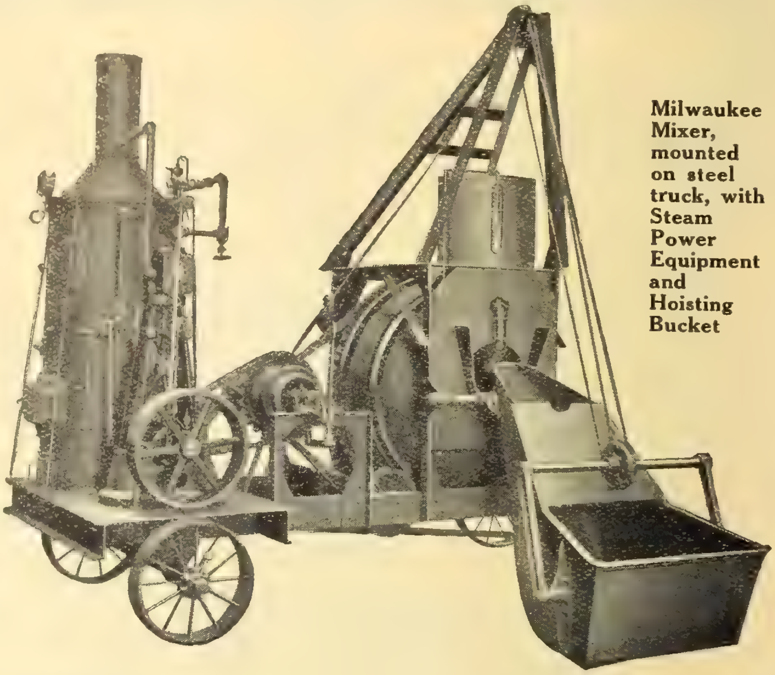
Milwaukee Concrete Mixer

Rosebery's Unequaled Proposition and one that is booking the orders. Write for 1911 Catalogue. Just out.



Milwaukee Mixer, mounted on steel truck, with Steam Power Equipment and Hoisting Bucket

OUR PROPOSITION

WE will put a Milwaukee Mixer on your work for a period of five days. You are at liberty to test it thoroughly in every kind of work. If, at the expiration of this time, you are not fully convinced that it is all we claim and superior to any concrete mixer in the market, return it to us and we will pay the freight both ways.

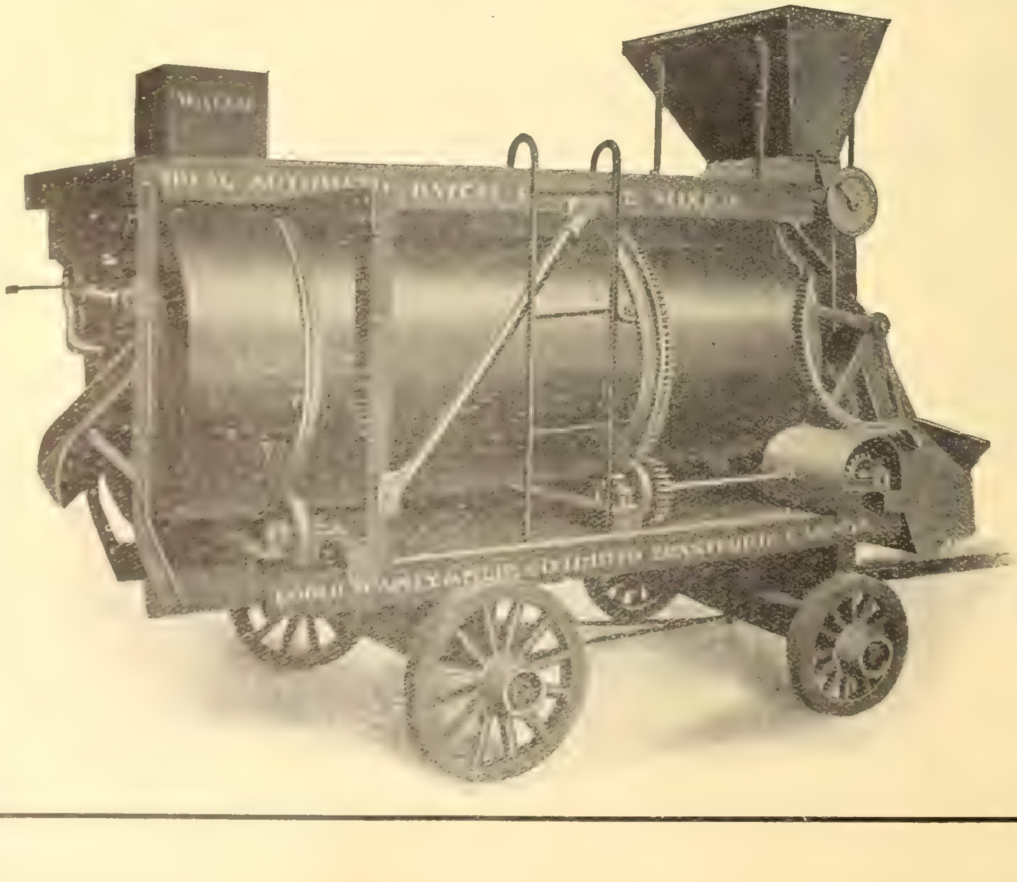
No firm ever made, or can make, a more straightforward offer than this, as it will not cost you a cent if we fail to convince you of the superiority of the MILWAUKEE CONCRETE MIXER.

Milwaukee Concrete Mixer and Machinery Co. - Milwaukee, Wis., U. S. A.

CANADIAN REPRESENTATIVES:

The Stuart Machinery Co., Winnipeg, Man. **C. W. Stancliffe & Co.,** Vancouver, B.C.

CONCRETE MIXERS



Our 1911 machine has all steel frame, Heavy Steel Gears; is the most up-to-date mixer made. It is a money maker.

We make

Tanks and Towers

for all purposes and any sizes. Gas and Gasoline Engines, etc.

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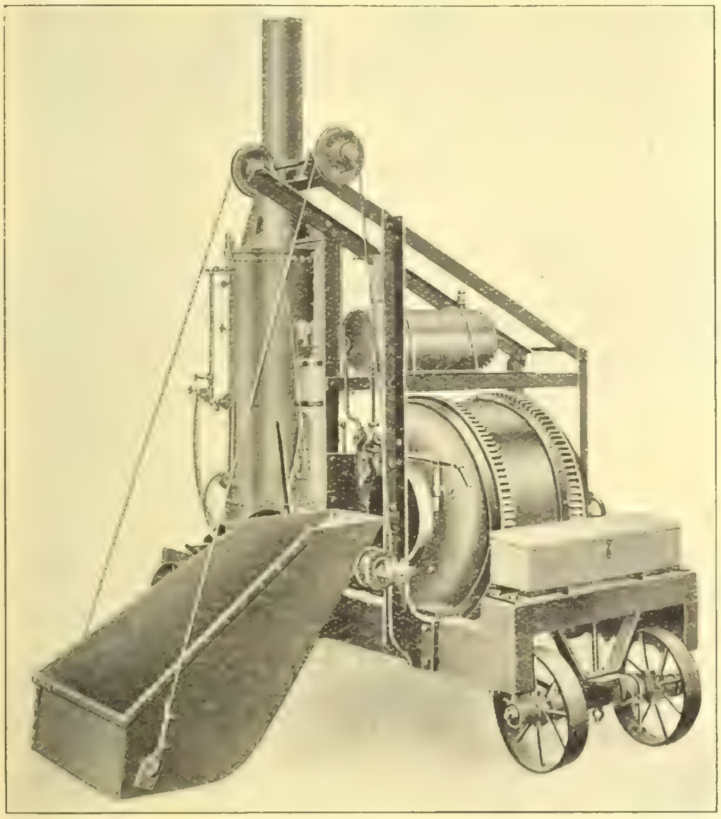
Better Concrete for Less Money



Concrete Mixer theories grow into definite mixing knowledge when every mixing action is a known positive mechanical force.

There's an individuality about Koehring Mixing—it's known mixing.

The drum is a plain cylinder with heavy cast iron heads, but bear in mind, it's made without deflecting faces or other obstructions, to limit the end-to-end mixing.

The mixing blades are so arranged that they not only lift and pour the aggregates from the side but carry them alternately from end-to-end and break them over against the heavy heads.

There's no guess work about it—no rolling over in the centre of the drum, every action of the aggregates is performed by a known positive mechanical force.

But there's another mixing than this in the Koehring Mixer.

When not in discharge position, the inner end of the discharge chute is tilted downward.

Material carried up by the mixing scoop at the side is discharged onto the inwardly and downwardly extending chute and decends from the inner end in a continuous flow, the entire width of the chute, and falls to the bottom at right angles to that from the mixing scoops and the end-to-end mixing.

That's three independent mixings, everyone of them a known mixing and no theories required to explain them.

Three known mixings in one, is why the Koehring Mixer is the fastest in existence.

But known mixing is not its only improvement over old style batch mixers.

The trunnion rollers are cast with wide flat faces, chilled to extreme hardness, and placed wide apart at the extreme ends of the drum. This not only guarantees a stable equilibrium to the drum, but insures its maintaining perfect alignment even after years of service. The outer end of the discharge chute does not tilt backwards, affording ample clearance for wheelbarrows, even in the smallest sizes. There are other worth considering features that every mechanical mind knows are correct in principle, explained in our new catalague.

Do not fail to write for it at once.

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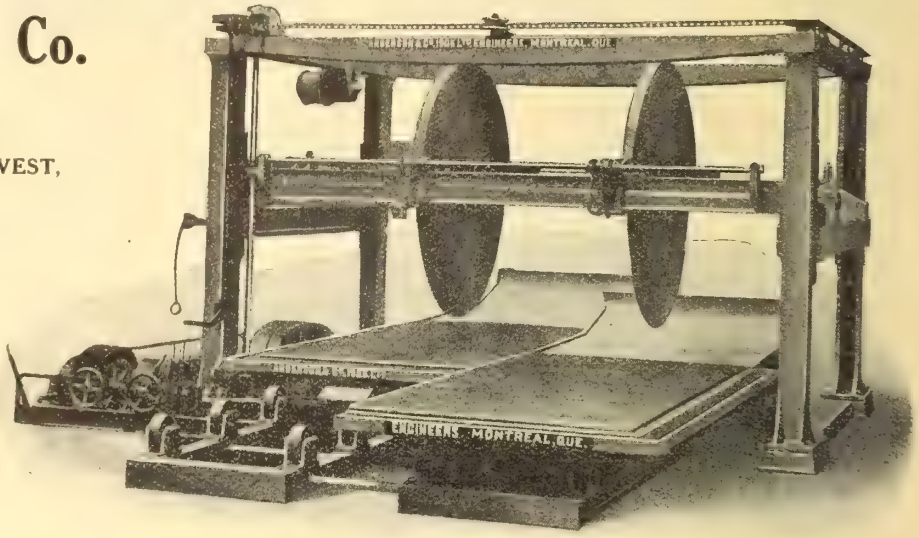
10 H. P. to 150 H. P.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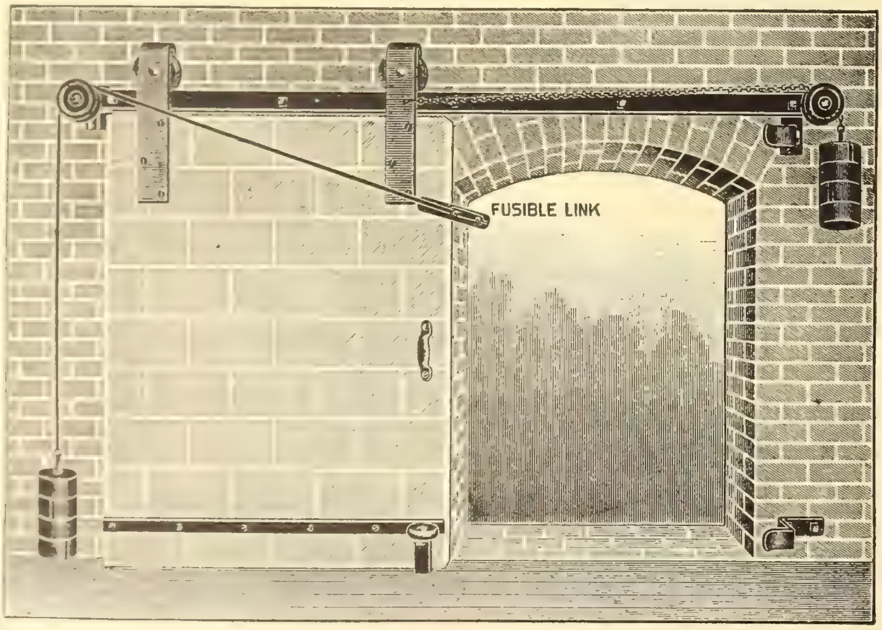

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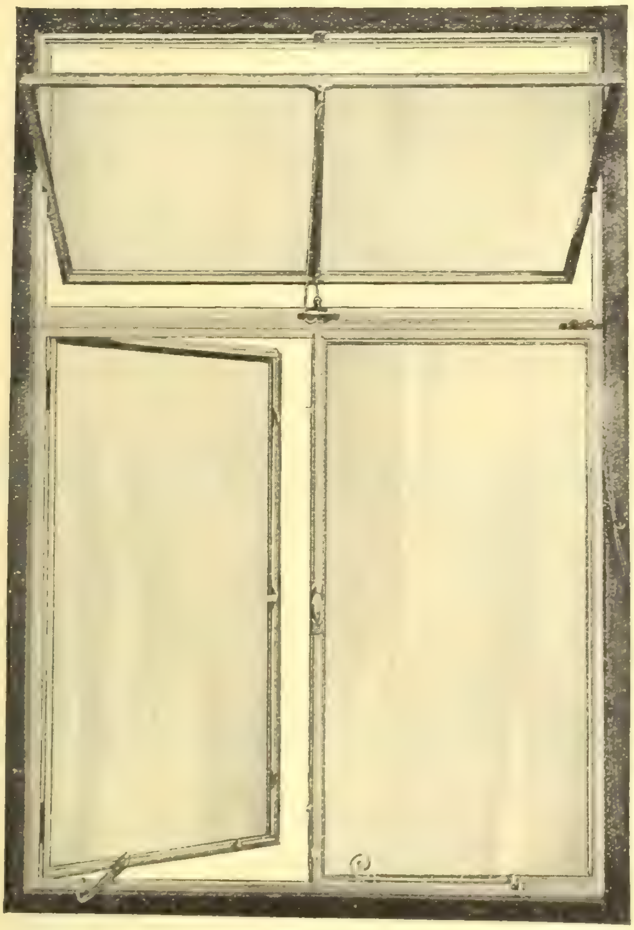
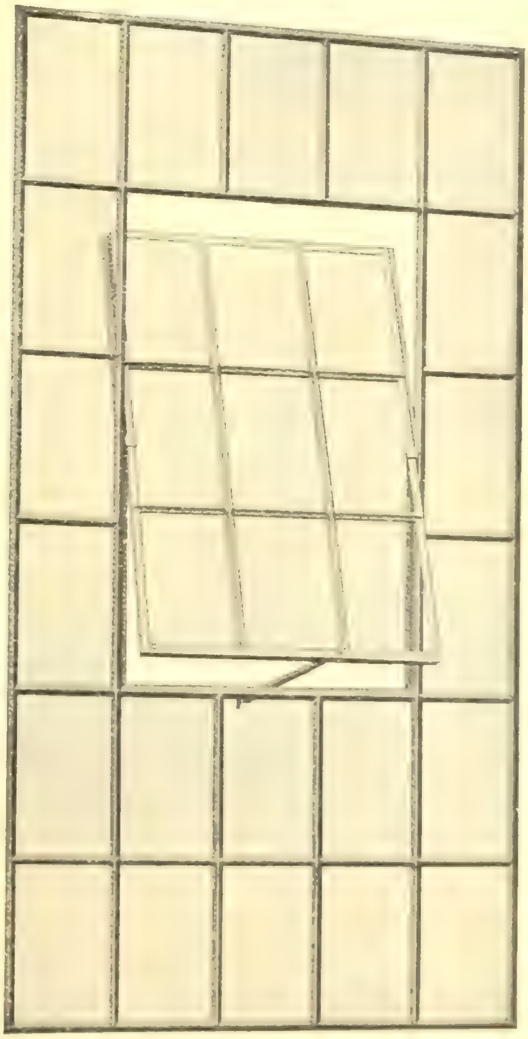
"FENESTRA" SASH

will give more glass area in a given opening than any wood or sheet steel frame. They flood a factory with light and fresh air—quickening labor efficiency. Every up-to-date building should be equipped with "FENESTRA" SASH.



High Grade Steel Casement

These windows are designed for the better class of office, banking and public buildings. They present a much neater appearance than the old wood sash and have the advantage of being fireproof and strong.



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There is no substitute being offered to the Canadian public that can stand the Test.

Hamilton Vitrified Salt Glazed Sewer Pipe Will

For 50 years we have been supplying our product for Sewage and drainage purposes all over this country and although there has been many substitutes offered, our sales have steadily increased and to-day we are the Largest Manufacturers of Drainage Material in Canada.

It will pay to communicate with us

The Hamilton & Toronto Sewer Pipe Co.
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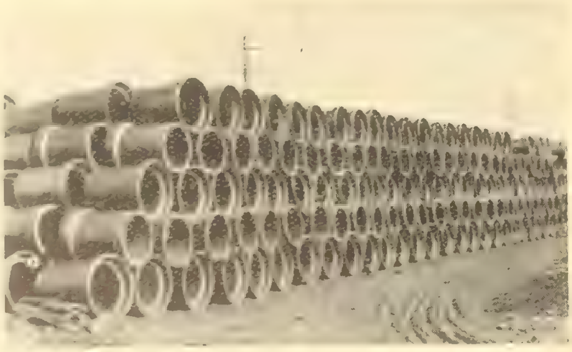
HAMILTON and TORONTO

We Don't Believe in Knocking



Pile of 18 inch Double Strength Pipe in our Yard

Because oft-times a knock is only a boost

BUT

if there arises in your midst the question of using some other kind of pipe in place of

SALT-GLAZED VITRIFIED PIPE,

just let us know and we will turn loose enough literature to keep you busy, contributed by eminent men in the engineering profession in all parts of the continent. You don't have to accept what we say. Listen to those who have bought experience of this kind dearly and who are willing, for humanity's sake to share

WHAT THEY KNOW

with you. So don't be misled by local amateur pipe makers.

"**Get Vitrified Pipe**" is our advice, no matter where you get it and **if you want the best, get "MIMICO"**

The ONTARIO SEWER PIPE COMPANY, Limited
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Sewer and Culvert **Pipes**

We manufacture Highly Glazed and perfectly Vitrified "Standard" and "Double Strength" Sewer Pipes and make a specialty of Double Strength Pipes for Railway Culverts.

We also manufacture Smoke Jacks, Inverts, Wall Coping, Flue Linings (square and round), Chimney Tops, Hollow Building Blocks and all kinds of Vitrified goods.

Fire Clay Goods, Stove and Range Bricks, Boiler Tube Bricks, Locomotive Blocks, and all kinds of "Special Shapes."

The
Standard Drain Pipe Co.
of St. Johns, P. Q., Limited
Factories at
St. John, P. Q. and New Glasgow, N. S.

No Wet Cellars No Damp Basements

Ceresit is a cream white paste readily dissoluble in water. This water is used instead of plain water for mixing Cement, Mortar or Concrete.

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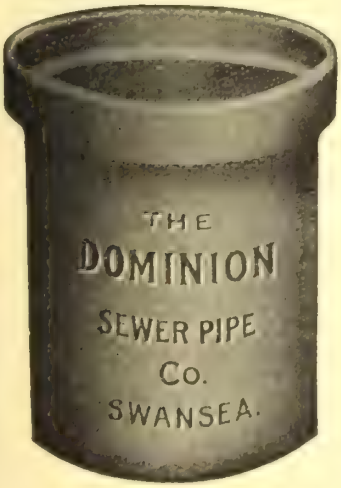
Salt Glazed and Vitrified
SEWER PIPES



True to Size.
Impervious to Water.

Sizes manufactured and always in stock 4 in. to 24 in.

Ask fo Price List and Discounts.

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Chimney Tops
Flue Linings
Wall Coping
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Inverts

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We can serve you best. Our prices are right. The quality of our goods is of the highest excellence. We are the largest manufacturers of **Vitrified Salt Glazed Sanitary Sewer Pipe** in the world. Sizes, 3 in., 4 in., 5 in., 6 in., 8 in., 9 in., 10 in., 12 in., 15 in., 18 in., 20 in., 22 in., 24 in., 27 in., 30 in., 33 in., 36 in., 42 in. Lengths, 2 to 3 ft. Socket, Standard or Deep and Wide. Thickness in sizes 15 in., to 42 in., both Standard and Double Strength: We also manufacture Flue Lining, Wall Coping, Vitrified Conduit, Vitrified Curb, Paving Blocks, Drain Tile, etc.

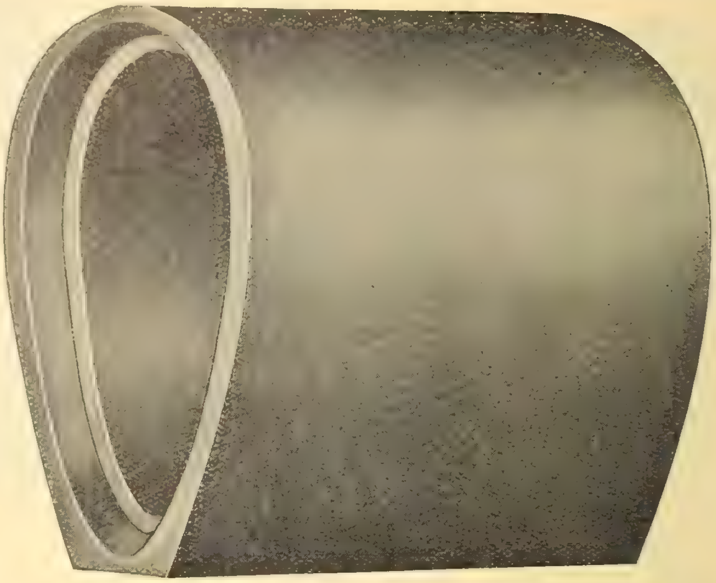
Send for Catalogue.

201 Devonshire St., Boston, Mass.

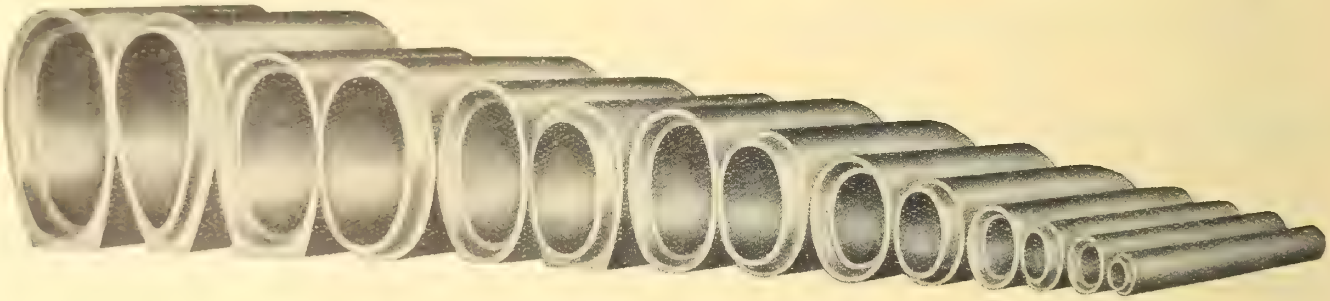
Municipal Engineers and Contractors

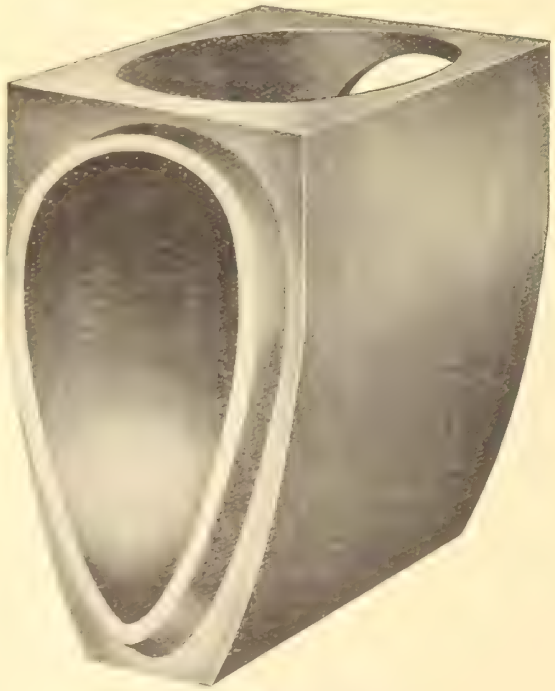
For **sewers** the only everlasting pipe is **concrete.** Builders do not use brick in foundations. Why? Because of the moisture. They do use concrete. Why? Because it is a proof against the destructive tendency of moisture. Why continue to use brick for sewers when a better material is now available at as low a cost?

In **Duluth** brick sewers failed after seven years so as to require replacement. **Concrete** sewers put in at the same time are **intact.** In **Millwaukee** after 25 years concrete pipe was found better than when new. Of 300 miles of sewers in **Millwaukee** over 200 miles are of **concrete.**



Section of 2' x 3' pipe





Man-hole Section of 2' x 3' pipe

Concrete sewers abound in **England** and **Germany.** The modern **sewers** of **Paris** are all of **concrete.** American cities have adopted it. **Brooklyn** has hundreds of miles of it with not a single failure, whereas even Scotch vitrified pipe has been found to have deplorably failed there. **Toronto,** after much hesitation, is now in line with concrete. Why be the last to join the ranks you eventually will and must join?

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We have replaced vitrified pipe with concrete pipe and have found over 50 per cent of the vitrified unfit for re-laying. We carry a large and mature stock, we guarantee the quality, we take care of breakage in transit, and we solicit your patronage.

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The great advantages of the "Champion" rock crushers are due to their commonsense construction. This is the rock crusher which has the distinction of being the **only one** on the market which possesses the famous Elliptical Cam, which device causes it to do as much work as other crushers when run at half the speed they require.

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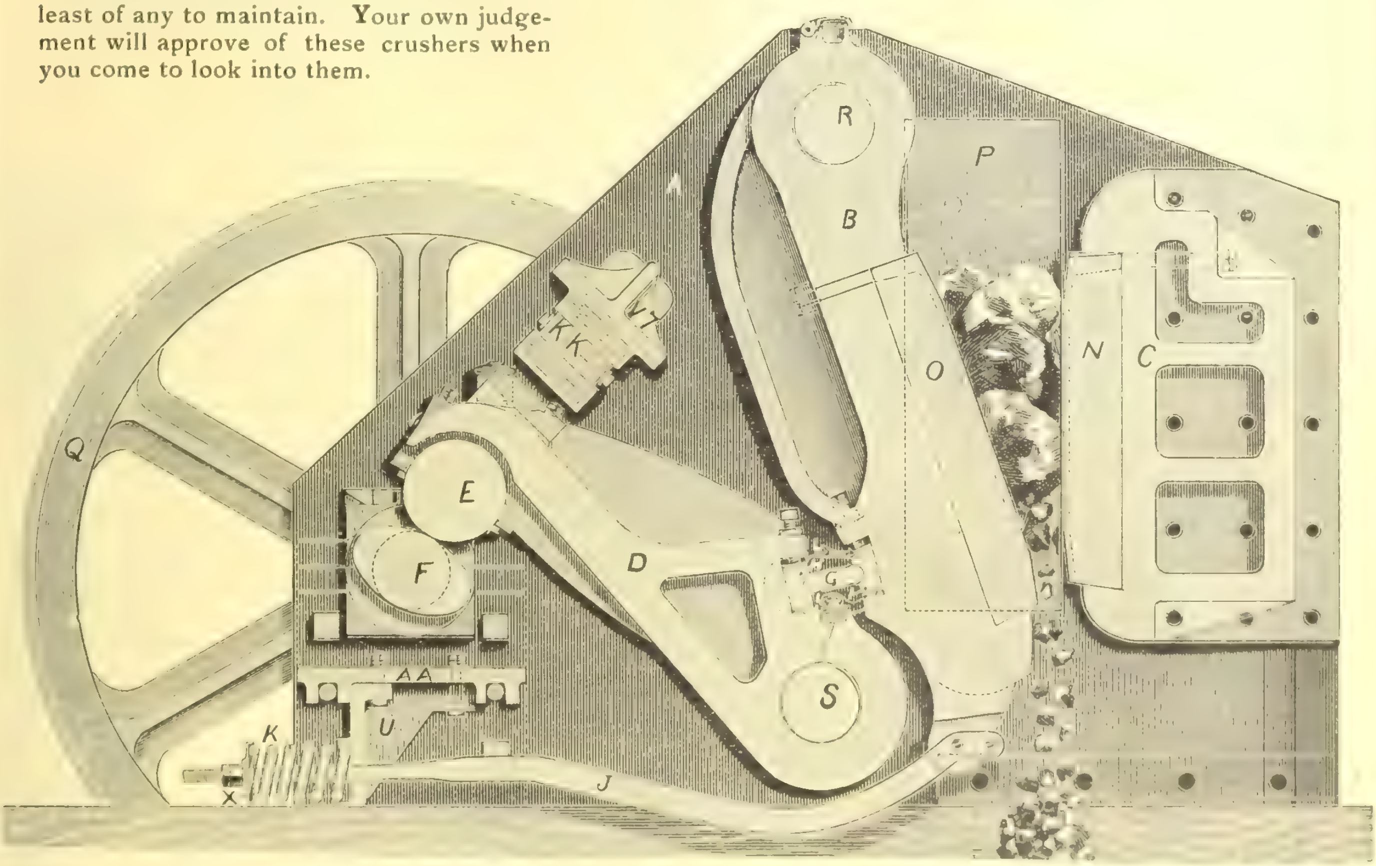

In the diagram you will note the Elliptical Cam is marked F. This is the seat of the action which gives the jaws two motions instead of one. In the diagram A is the main frame. B is the moving jaw, C the stationary jaw, E the anti-friction roller, G the toggle, K J the tension moving spring and spring rod, O moving die. N stationary die.

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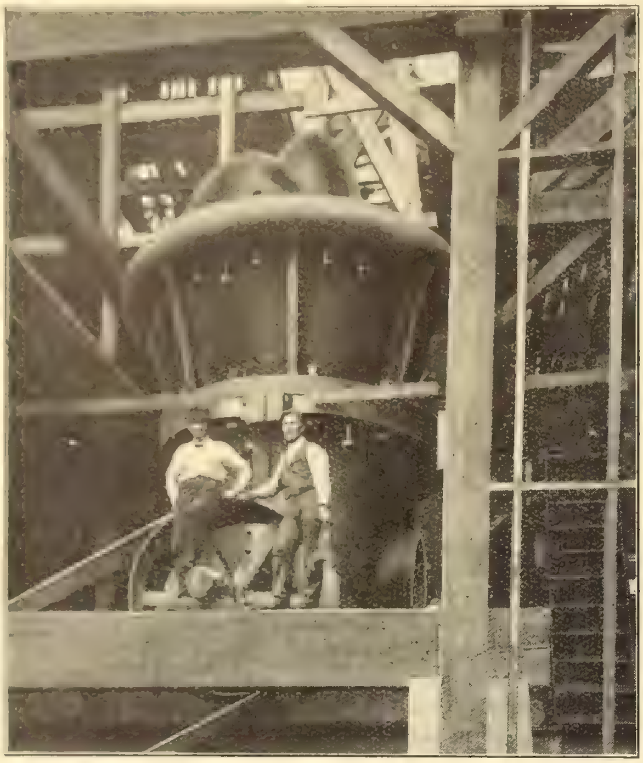

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View No. 3

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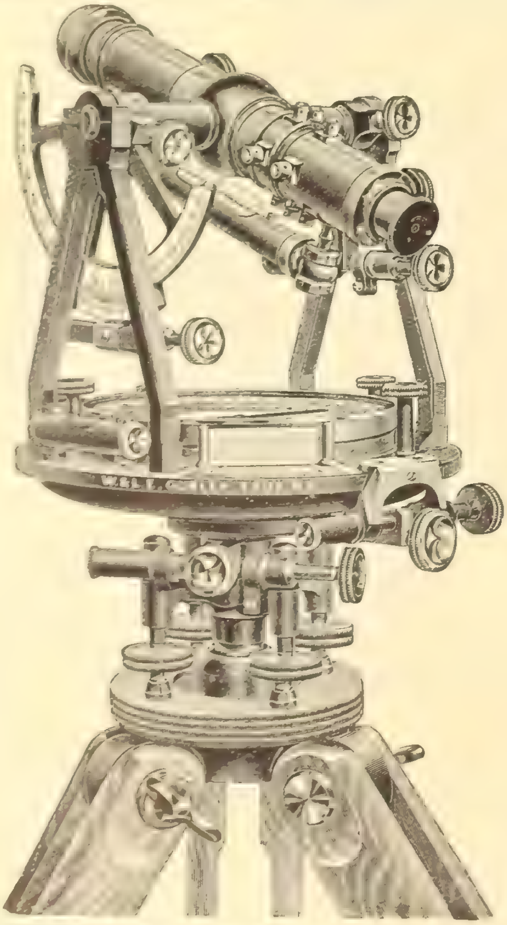

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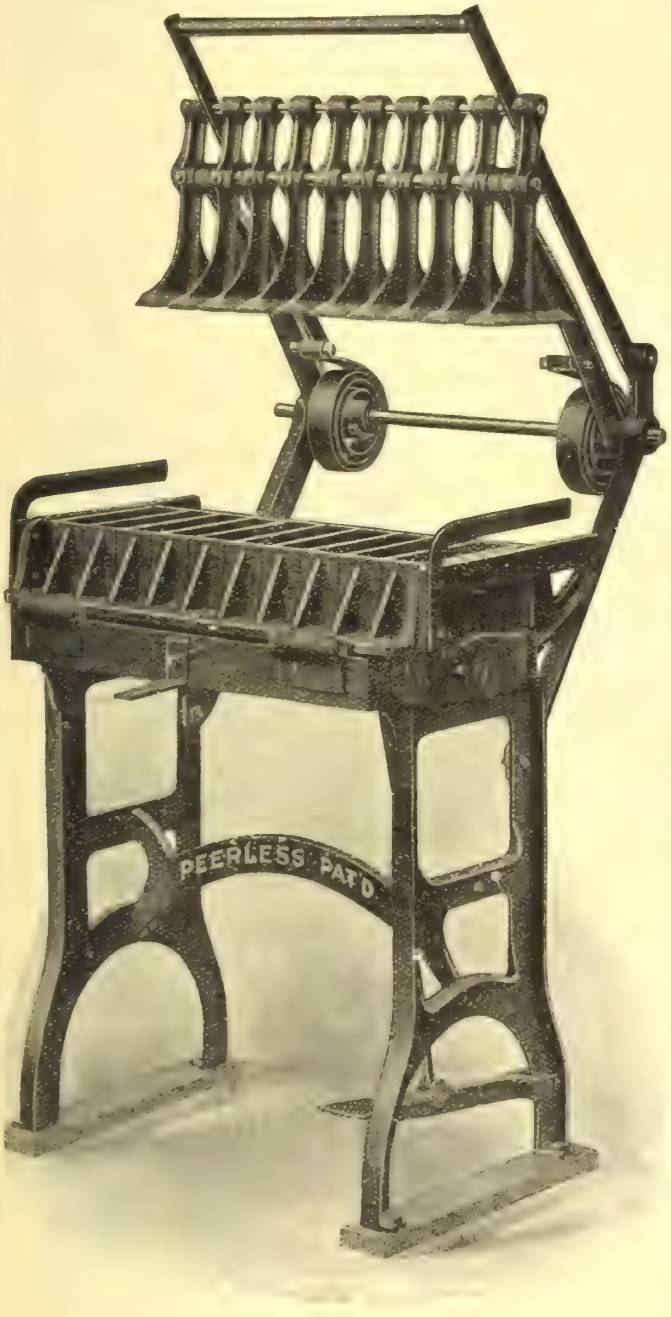

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The PEERLESS is a moderate priced machine on which you can make more perfect brick per day than on any other. Brick are made face down and delivered face up on pallet board. Cement brick find ready sale. We tell you how to start a profitable business.

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Machines for Canadian Trade are manufactured in Toronto, Ont.

Awarded Diploma by Canadian National Exhibition,
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FIRE ROOM
METHODS
By
F. R. LOW

This bulletin contains an account of a visit to the power plant of the Wood Worsted Mills, Lawrence, Mass., and an interview with the Consulting Engineer, Mr. Geo. H. Diman. It is told in a most interesting manner by one of the foremost technical writers in this country.

The description of the design and operation of the power plant which has proven in actual operation to be one of the most efficient and economical ever constructed, together with the description of the appartus responsible for results is of interest to everyone connected with power plant work, whether they be engineers, superintendents, managers or owners.

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We make machines of every size, equipped with any power operated by hydraulic, jetting or spudding processes.

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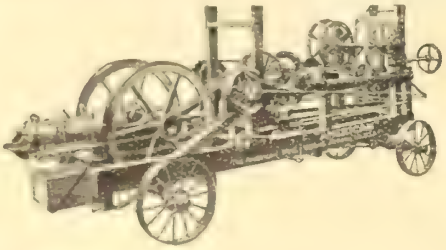

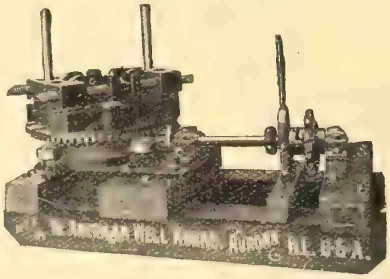

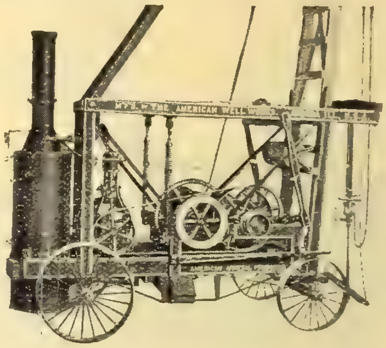

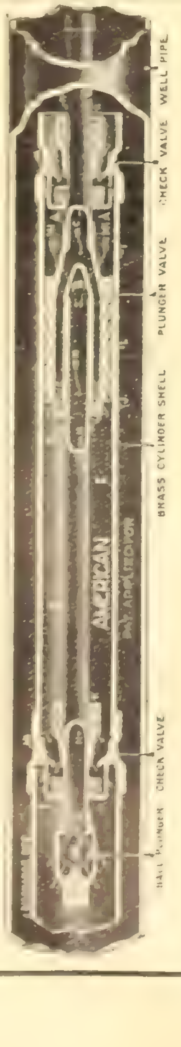

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Valves to **"American"** pumps are so designed that they can be drawn from the well with the plunger rods without disturbing the well casing. It's a little more expensive to build them this way but mighty convenient in use.

If you require deep well pumps for any purpose, pin your faith to a pump of known quality—the **"American."**

Built in any size, equipped with steam heads, pump jacks or geared direct to motor.

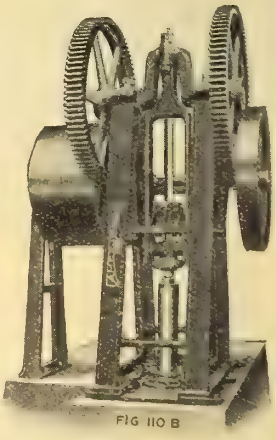

FIG 110 B

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OR

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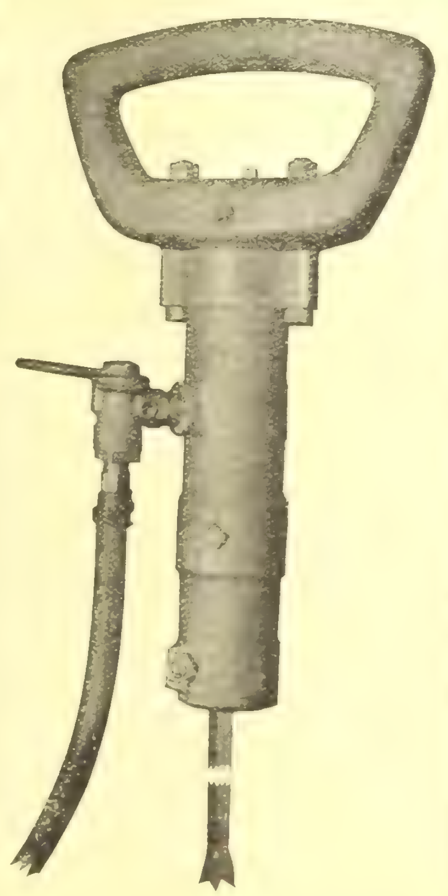
The tool is designed for down holes only, yet it has a wide range of application. It has been found to be thoroughly adapted to all kinds of excavation work, particularly to trench excavation for sewers, gas and water mains; in sinking foundations, building bridge piers and in shaft sinking in a mine.

Although this tool has been on the market only a comparatively short time it has found great favor among the contractors and miners, with the result that there is a great demand for it.

The principle of the Hammer Drill is too well known to be explained here, but it's extreme simplicity, (only two moving parts) steady reliability and ease of upkeep should be given proper consideration by Contractors.



As it requires but a moment to change steels and as no setting up is necessary in changing holes; from seventy to ninety per cent. of the time paid for is applied in actual drilling, while with the ordinary piston drill a great deal of time is spent in these operations. This is an important feature where a number of shallow holes are required.

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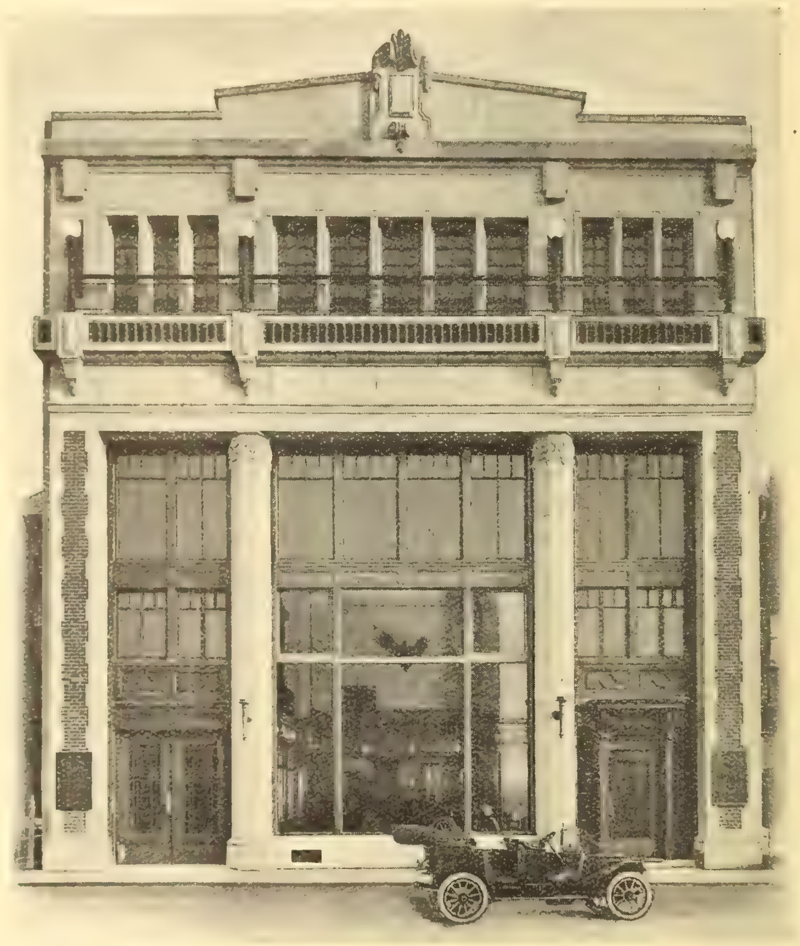
(Trade Mark Registered)



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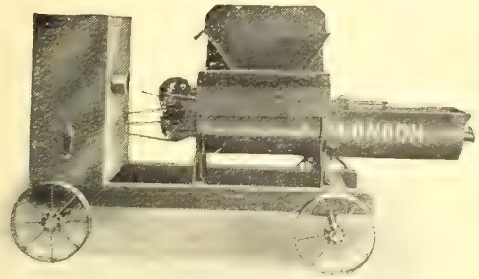

London Automatic Batch Mixer No. 1
Capacity 50 yards per 10 hours.

London Concrete Mixers

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Asbestos-Cement Shingles are weatherproof — fireproof — timeproof. Cannot rot, rust, crack, split or blister. They literally outlive the building—without repairs.

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You can get Asbestos-Cement Shingles in shapes and sizes to fit any architectural scheme. Three colors, Newport Gray (silver gray), Slate (blue black) and Indian Red. Ask your roofer for new quotations.

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This photo was taken on Feb. 4, 1911. All foundations were carried to rock.
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Vol. 25 April 5, 1911 No. 14

Constructional Forecast

The indications are that 1911 will at least equal if not exceed 1910 in building activity. We regard this as a most conservative statement. We prefer a rational outlook to the exaggerated optimism of the professional booster, but at the same time we can find substantial reasons for encouragement. The advent of spring was heralded by a better defined interest in all constructional projects and each weekly report now received from large commercial centres, especially those of western Canada, shows distinct improvement. Montreal has set the pace in the east and is progressing well enough to sustain the credit of the whole section. When the building returns for the first quarter are available it will surprise us if this city has not increased at least 100 per cent. over the first three months of 1910. Certainly it is most encouraging and suggestive to find such activity and such excellent prospects in the commercial metropolis of the Dominion. Toronto had a particularly good season last year and is now holding up her end, which carries sufficient weight to preserve the balance of activity and progress.

It goes without saying that great things are happening in the west. Vancouver's wonderful record will be found in another column. In Winnipeg the business for the year so far has marked a fair increase on the corresponding period of 1910, and it is expected that the eighteen-million mark will be reached this year, but from all reports it is Calgary that is doing the most hustling in proportion to its size. A prominent Calgary builder told our representative in that city that he expected the building permits for 1911 to total $8,000,000. For the first two months there was an increase of about 150 per cent--an excellent start.

No changes of importance have taken place in the market for building materials and there is the usual uncertainty in regard to labor. At Edmonton, Calgary and Lethbridge declaration has been made for "open shop" on May 1st. It is quite possible that the unions will have something to say to this. Strike rumors are prevalent at Montreal, but of course it is early to make predictions.

Public works will be kept up to the usual volume. Plans have been started quite generally for sewer work, water systems and extensions, electric light plants and other lines of public utility and public necessities, and they will all be carried out, with the exception of a few which may be hung up in the council preliminaries. Practically none of them will be deferred because of any hesitation on the cost, except where it develops that the funds provided are not sufficient to cover the bids entered.

Private work will be irregular and uncertain as to volume. Some sections will show a gain over last year and others will have a slump, depending upon local conditions.

Viewed from the standpoint of the man who will furnish materials, the outlook is for a good season. The spring demand for the different building materials will probably be enough to show that there need be no serious accumulation for which there is no outlet. The cement trade bids fair to be well sustained through the constantly expanding demand for it in new applications as well as in the need of older methods. The brick trade seems likely to come in for a somewhat better demand this spring, due to a little more activity on the part of manufacturers to push their wares. Building iron and steel will have a very fair trade, though it will probably be lacking in the rush which has marked previous seasons.

Equipment of School Buildings

While the recent disastrous factory fire in New York has directed public attention in such a shockingly tragic manner to the lack of fire protection in all buildings where any large number of people are assembled, Canadian municipal authorities might well make particular inquiry regarding the better safeguarding of the children in the public schools. One method thus far overlooked is the equipment of school basements and stairways with automatic sprinklers. Since they are required in all theatres, why not in school buildings? Fire drills, enclosed stairways and ample fire escapes are good, and necessary, but they do not extinguish a fire once started, nor create a damp safe passage to the open air and safety. From the standpoint of parents alone any reasonable expenditure in this direction would be justifiable.

Contract Bonds

Two interesting contributions on the subject of corporate bonds for contractors, commented upon editorially two weeks ago, are published in another column.

This is a live topic in the trade. The argument of one of the writers that the bond companies require as much security as they give, and that such bonds are therefore theoretically very good but practically impossible to obtain, seems to be fully answered by the record for last year of the Toronto office of one of the bonding companies, which wrote 608 bonds for a premium consideration of $47,115.95, covering contract liability of $3,766,717.26. In only one small case was security taken, and this was where the contractors were strangers in the city and voluntarily offered the security to expedite the issuance of the bond.

The bridge case cited by the other correspondent is a matter of public record, and it much be admitted that the construction company, defaulting as the result of an accident, satisfied the government- which was the principal in the case to the amount of the bond, which was consequently released. Its purpose would seem to have been well served. That the construction company was otherwise financially weak is another matter.

To quote the correspondent who thinks such bonds practically impossible to obtain: "We are thoroughly convinced that no job of any importance should be awarded without asking a bond from the contractor."

Value vs. Price in the Award of Contracts

It is somewhat surprising to note that in spite of the fact that the acceptance of the lowest tender is almost a general practice, few contractors are very enthusiastic in its behalf. Since the publication of our editorial on this subject in the issue of March 1, we have received a number of letters and have heard several opinions expressed, but the general tenor of them all is that the first consideration should be value for value and not the lowest price obtainable. "Value," says 'A Western Firm,' writing in our last issue, "remains long after price is forgotten"—an epigram which may be worth committing to memory. Still, the fact remains that while the municipal corporation does not bind itself to accept the lowest tender, it nevertheless is usually accepted, as may be proven by a study of the weekly lists of tenders published in our Contracts Department. Contractors find out from such sources the approximate rates which their competitors are quoting for each class of municipal work, and consequently know within a little what they must ask. Occasionally—very occasionally—a contractor may be somewhat embarrassed financially and the securing of a good contract would re-establish his credit. In such cases he may decide to quote the bare cost of the work to be done, which is good for the municipality. On the other hand from an insufficient knowledge of local conditions and an inadequate idea of the responsibilities, he may quote a price at which a good job is out of the question. Here, then, is one of a number of instances in which the acceptance of the lowest tender would be inimical to the best interests of the municipality. The question rests with the engineer and his attitude on such matters is a measure of his efficiency or otherwise. If a storm is to be faced by recommending a higher tender he should have the courage to do so. Certainly he should refuse to advise the acceptance of any tender, the amount of which does not in his opinion cover the actual cost of the work to be done. The responsibilities of the engineer in this connection were defined very nicely by Mr. Lochridge in a recent discussion of the Boston Society of Civil Engineers. Mr. Lochridge said:

"We, as engineers, have responsibilities in laying out work and giving to the contractor the fullest and most accurate details that we can. I think that contracting at best is a gamble, in the bringing in, as it does, of various conditions of weather and of material and of labor conditions, etc. It is for this reason a duty of the engineer to place all the facts as clearly before all of the bidders as can possibly be done.

"After the enginer makes his estimate and knows something of what that work is to be, he should go over the bid very carefully to see whether the contractor has bid enough to do the work, because I believe it is very poor economy to let the low man have the job simply because he is low.

"I think that, too, is a province of the engineer, where it is possible and where it is right and just, to see that the conditions under which the job must be done are fully considered and balanced at the end of the work just as fully as they are at the beginning."

Renewal of Building Equipment

At this season of the year many contractors are beginning to make preparations for a vigorous work season, and are maturing plans for new work. During the winter season much outfit and many tools have lain idle. Most of these will be put to work within the next few weeks. When they were stored in the autumn they should have been properly housed or protected from the weather, but now that they are to be put to hard usage everything should be completely overhauled.

Parts that are cracked or broken, especially gears, should be renewed, as one tooth stripped from a gear wheel may mean that as the machine is being used to its greatest capacity so many teeth may be stripped from the gears as to put it out of commission. This not only means expensive repairs, but time is lost on the work and men who receive monthly salaries are being paid, when productive work is not going on. In the same way, boiler fittings should all be made good and new grate bars put in the fire boxes. Burnt-out grate bars not only mean a considerable waste in coal, by half burnt coal dropping through the bars, but the boiler does not steam well as the full value of the fuel is not obtained.

Old wood work on machines should be renewed. This is especially true as to cars. How often one sees contractors' cars with the wood work all knocked to pieces, so that the cars operate with difficulty and part of the load is spilled before it reaches the dump. This also applies to carts. Scrapers should be repaired, especially the pans. Many will be found to need new cutting edges, and wheel scrapers may need new boxes in the wheels.

Special attention should be given to derricks and derrick fittings. After standing out in the weather unused all winter, derricks should be entirely overhauled, as the risk of killing men, working around them, is too great to assume. Piledrivers, too, should be well inspected, and repaired, wherever necessary. This applies to all the heavy machinery as steam shovels and other heavy excavating apparatus. Locomotives likewise need a complete overhauling. Ask any master mechanic of an operating railroad as to the necessity of going over a locomotive at regular intervals, and he will tell you of the importance of such work. One should not expect good work to be done, when one's machinery is out of order. A loaded train must sometimes be divided because the locomotive needs a little shop work done on it.

All machinery should be painted each spring. Paint means protection both from rain and sun. If metal is painted late in the season and exposed to the sun the paint is likely to blister, so all painting should be done early in the spring. Not only does paint make an outfit look a hundred per cent. better, but it pays for itself quickly by preventing the metal parts from rusting and the wood from splitting.

A contractor's name should always be kept plain and bright on all of his outfit. This is just as important as names on railroad cars, as it shows at once the ownership, and acts as an advertisement. In traveling on a train, when one passes a contractor's outfit at work, it is nearly always impossible to tell whose machinery it is, as the names have generally been effaced.—The Contractor.

The Reader's Views on Current Topics

Contractors and Corporate Bonds—The Element of Value in the Award of Contracts—Defects of Trades Unionism

Contractors' Bonds

Editor, Contract Record:

Referring to the article on the above subject published in your issue of March 22, in our opinion, corporate bonds are theoretically very good, but practically impossible to obtain. The bond companies require as much security as they give, and if one has this amount of security to hand out, it might just as well be given to the proprietor, who makes no charge for accepting it, as do the bond companies.

The bond companies are careful and conservative, so much so that they require a firm to have nearly as much capital as it does business in the year. Few contracting firms are in this enviable position, and it is only these few who can buy a bond when they want it. Others have to make out as best they can.

We are thoroughly convinced that no job of any importance should be awarded without asking a bond from the contractor. We believe that if bonds were asked for more frequently contractors would be more careful in making estimates, have more knowledge of the cost of doing work and live longer in the business. More contractors fail through the lack of knowledge of the cost of doing the work than through difficulties of executing intricate building problems. Many contractors will take a chance in figuring on work that they would not take if they knew that they could not obtain work without giving a bond, and that their estimates of the said work would be carefully scrutinized by the bond companies, whose view point would be the completion of the job rather than the signing of the contract.

Yours very truly,
"A P.Q. Contracting Firm."

Famous Bridge Case Cited

Editor, Contract Record:

I have read the article in your issue of March 22nd in which you discuss Contractors' Bonds at a rate of one-quarter of one per cent. on the amount of the contract. This rate seems to me to be very low and it must represent not the total cost but the annual premium. Very few works are fully completed and paid for within twelve months of the acceptance of the tender, and thus it means doubling or perhaps trebling the amount of the "premium."

The attitude of the bonding company is well shown in an example which came to my attention recently. A bridge concern was bonded for $100,000, but the bridge collapsed before completion. The case was discussed in all the papers but the company did not pay, they having received timely notification. What they did was to keep the premiums which had been paid in good faith and calmly shake their heads when requested to pay up.

This question of bonding contractors recently came up at a committee meeting at the Toronto City Hall, when it was stated that the city had never lost anything by accepting personal sureties, and no change was made.

I am of the opinion that personal sureties, given by those having an interest in the contract, are the best. Thus if a supply man becomes surety for a contractor, he will see that he gets his supplies on time for it is to his interest to do so. This is no small advantage to the contractor. Then in the unlikely event of the supply man seeking to take advantage of the contractor by putting his prices up, why, I think I can see his finish.

Yours truly,
"Building Contractor."

Value vs. Price

Boston, Mass., March 30, 1911.

Editor, Contract Record:

In your discussion of the award of contracts you have touched upon a subject in which we are all interested. The exercise of the privilege of accepting other than the lowest tender often enables corporations to obtain better value either in the actual contract or in the supply of materials. It frequently happens that it is just permissible under the specifications to tender at a low figure for certain materials and classes of work when the superiority of materials quoted at a higher figure is so great that the corporation would be actually losing by accepting the lowest bid, even though the specifications could be enforced. There would be many things to offset the difference in price between the tenders and to make the lower the more expensive.

In the award of contracts there are many things that should receive equal consideration with cost. The general reputation of the tenderer should be taken into account, his ability, the quality of his previous work, his responsibility, organization and equipment. And in awarding contracts for material, quality, supply and the general reputation of the tender should certainly be considered as much as the figure.

Occasionally circumstances arise which seem to justify the consideration of nothing but price. But these are of only occasional occurrence. The other things should be considered more often than they are. It may be said that the course suggested opens up opportunities for graft, but grafters are few and far between nowadays and the remaining few are rapidly passing.

Yours truly,
A. H. Stowell.

Are Competent Engineers Scarce?

Editor, Contract Record:

When you begin to discuss the "lowest tender" you are opening up a very important—in fact a vital question, and it is difficult to draw the line.

One difficulty is that many municipalities ask for tenders without previously giving the matter careful consideration or getting any kind of estimates or information as to the probable cost of the work. They seem to think that the cheapest and easiest course to pursue is to advertise for tenders, when possibly the work in view will not be gone on with. I am not aware if common law would compel any municipality or corporation to accept any tender or to reimburse the parties tendering if their advertisement specified "the lowest or any tender not necessarily accepted." The vital point in this seems to me to be that in cities like Toronto, Hamilton, Ottawa and other places, the councils are anxious to get the benefit of the lowest possible figures but at the same time are anxious to leave the work in their own city. This, I think, is reasonable and fair, but it is not reasonable or fair to put outside parties to the expense of tendering if they have no intention of giving the work outside their own towns.

I consider that one of the great difficulties in connection with this matter is the scarcity of competent engineers or architects in charge of municipal work or even general work. It is surprising the lack of knowledge as to prices likely to govern under different conditions. If the general public only knew the difficulty contractors have in trying to make up estimates on the information furnished by so-called engineers and architects, they would be very much surprised. It is common practice for municipalities and corporations to employ men at a cheap figure. These men may be specialists in a small way and familiar with only one line of engineering work, and when it comes to something in a special line, they have to fall back on certain text books from which they prepare certain work and then rely on the contractors to do the rest.

My idea is that any municipality or corporation asking for tenders on work should have the plans prepared complete and made so clear and explicit that every contractor is bound to figure on the same basis; moreover, only reliable and experienced contracting firms should be asked to bid. In many cases the parties in charge of work and the inspection of work are not competent and the contractor who has secured the work at a price so far below the correct figures has no difficuly in skinning the work and dodging certain features of the specifications. The engineer in charge, or the inspector, is no wiser and therefore the general public are cheated out of the proper results.

As previously stated, when you raise this question, you are going into something very serious. Many remedies have been discussed to try and overcome difficulties such as these. One remedy which has worked satisfactorily to a certain extent is to place work in the hands of a reliable contracting firm and agree to pay them a percentage on the cost. Before going on with the work, however, a fair and reasonable estimated cost should be arrived at, and in the agreement with the contractor it should be understood that a reasonable figure is a certain amount. For all he will save under that amount pay him 25 per cent., and for all he may exceed the specified amount dock him 5 per cent. Even with this system there are difficulties, but anyone who has had a few years' contracting experience will tell you there are difficulties all the time and every minute of the day.

Unions at Fault

The tendency in these days is to scant work and to use poor material. This is a very serious question indeed to contractors and firms willing and anxious to use first class material and to give good results in workmanship. Unfortunately with every trade so thoroughly organized by the unions, skilled mechanics and tradesmen are becoming more scarce every day and there is no longer any incentive for a working man to make himself a better tradesman than he may happen to be. In my opinion, it is the greatest possible farce to say that tradesmen of a certain union shall all be paid the same wage per hour, whether they be good, bad or indifferent. It is an undoubted fact that the abilities of men vary in professions, and the same must be the case in trades. To say that an inexperienced tradesman—no matter how husky he may be—shall be paid the same wage as a first-class experienced man, or that an elderly man, who is past his prime and not able to do as much as a younger man, shall be paid the same is not reasonable. Every man should be paid what he is worth and the good man should not be kept down in his wages by the poor man; neither should the poor man expect to receive the same wage as a good man; nor should an energetic man be held back to the level of a lazy man.

Yours truly,
"Contractor."

Conditions in Railroad Camps

Editor, Contract Record:

Referring to your recent articles anent conditions in railroad camps, I must say that my experience leads me to believe that things are nothing like as bad as have been represented. I have been in a number of railway camps in the different provinces of Canada. In some cases they have not been as clean or sanitary as might be expected, but I am of the opinion this was due very largely to the men themselves. My experience is that no matter what precautions you take, no matter how you try to keep everything in good shape about these camps, it is most difficult to get the men interested. They seem to be full of the idea that they are only temporary quarters and that any kind of conditions are good enough for a short time.

In our own camps we do everything we possibly can to have all the conditions as near right as possible, but it is difficult—in fact almost impossible—to get the men to take any interest other than in making sure that they get plenty to eat. And it would astonish an ordinary individual to see what a hungry railroad man can get away with at one meal.

Yours very truly,
"A Close Observer."

The Lowest or Any Other Tender Not Neccessarily Accepted

Ex-City Engineer writes:

"I thoroughly agree with you that the above caluse must be used with the utmost caution. In fact it bears a close resemblance to the proverbial function of fire —"a good servant but a bad master." Only once in my experience have I ever advised the acceptance of any but the lowest tender. In fact I think that with the ordinary municipal contract the only excuse for the acceptance of any other tender is in a contract where failure to complete in time may mean serious loss or danger to the city, or in the case of some highly specialized work in which previous extensive experience is practically an essential to successful completion. The ordinary municipal contract properly handled practically precludes danger of financial loss to the municipality."

Object lesson roads, aggregating 1,007,596 square yards, were constructed by the United States Office of Public Roads during the fiscal year ending June 30, 1910. Of this total area 722,485 square yards, or nearly 72 per cent. consisted of earth and gravel roads.

Causes and Prevention of Masonry Failure

In an investigation to determine whether or not monolithic concrete construction will prevent or delay failure under ordinary conditions, an analysis has been made of the various causes of masonry failure by the committee on masonry of the American Railway Engineering and Maintenance of Way Association. This study was made from the reports of a number of railroads and a report on the subject by Prof. G. F. Swain. The principal causes are summarized as follows: 1. faulty design; 2. poor material or poor workmanship; 3. temperature cracks; 4. disintegration of the masonry; 5. improper filling; 6. scouring away of the material underneath the masonry; 7. material sliding and carrying the masonry with it.

In the discussion of faulty design a number of points of common weakness are noted. The masonry may be placed on grillage above the water line, which rots and allows settlement, or the grillage may rest on piling where too high a unit stress is used for timbers in compression. The U-abutments may have their wings built too light. Too high a unit pressure may be allowed on the earth in front of the abutment or on piling upon which it may rest. Failure may be caused by settlement, which frequently causes a crack to appear where the wing leaves the main portion of the abutment, or in the case of arches, the wings may separate from the body of the arch, or the arch crack from 10 to 20 feet on each side of the centre line of the track, depending on the height of fill. Again, lack of proper drainage may result in failure.

Commenting on the probable behavior of a monolithic structure under these faulty conditions, the committee observes that if the settlement were not uniform in the cases of the rotted or overstressed grillage or of the overstressed foundation soil, cracks would develop unless reinforcement were provided to prevent them. An ordinary single-track abutment up to 20 or 25 ft. in height would probably settle without cracking. Abutments built in sections divided by vertical planes would be provided against such cracks. In arches under high fills and on ordinary soils it is difficult to prevent cracking of the abutments and ring unless reinforcement is used, as the foundation pressure in the centre of the arch support is much greater than at the end of the wing walls, and the plain monolithic is not strong enough to distribute the load uniformly. Such cracks as these are unsightly but seldom dangerous.

The study of failures due to temperature cracks showed a wide variation of practice in providing for expansion and contraction in large monolithic structures. Abutments were reported in lengths of 60 to 100 feet, plain concrete, without such cracks, and with reinforcement, 150 feet. In any case, the temperature movement of the concrete is greater than that of the material adjoining it, and the structure must be strong enough to overcome the friction between the two if there is to be no cracking.

Failures due to disintegration of the masonry are traced to freezing and thawing of exposed surfaces, particularly where water drips through an arch ring or where the masonry near the ground is exposed to alternate freezing and thawing, and frequently also to exposure to salt water, alkalies, acids or heat.

Relative to improper filling and dislocation of masonry by sliding material the committee comments that a well designed monolithic structure will resist failure better than one built in sections.

Scouring of material underneath the masonry may result from unusual freshets, from driftwood, wagon bridges, etc., lodging against the masonry, from ice gorges, or from the size of the opening being too small, thereby causing the water to rise during a freshet and to assume increased velocity and scouring power. Under these conditions the abutments are apt to tip forward or settle bodily downward. It is believed that a monolithic abutment will resist the pressure back of it under these conditions better than one built in sections, for when one part is undermined the balance assists it, and if the whole abutment tips forward, the movement is at times slow and complete failure may be prevented by relieving the pressure at the back or putting in props and bracing them across the bridge opening.

New B.C.E.R. Tram Station at Vancouver, B. C.

Messrs. McDonald & Wilson, contractors, have taken out the building permit for the tram terminal office block which will be erected for the British Columbia Electric Railway Company at the corner of Hastings and Carral streets, Vancouver, on the site occupied by the present station. The plans for the building have been prepared by Mr. W. M. Somerville, and show a five-storey structure, the foundations being of sufficient strength to permit of additional stories being added in the future. The plot covered is of irregular shape occupying the space taken by the old terminal offices as well as the Carral street block now being used for general offices. The intention is to build the corner section first and then remove the offices to the new building, then the present office building will be razed and rebuilt to conform to the new plan. The estimated cost of the work is $350,000 and the contractors will probably start demolishing the old building in a few days.

New Tram Station at Vancouver

In the new block the entire lower floor will be used for interurban tram business, three tracks entering from Hastings street and the balance of the floor being taken up with a large waiting room, ticket office, etc. The upper four stories are to be entirely devoted to the company's offices.

American cement manufacturers are pushing their foreign trade, having shipped abroad last year 2,475,957 barrels, against 1,417,534 barrels in 1909 and 846,780 barrels in 1908.

Thousands of men are killing themselves by worrying over what might happen to them.

Types of Concrete Bridges and Culverts

Considerations for the Municipality and Contractor—Safety and Permanency of the Construction Described Economy in Cost Illustrated

By Thos. H. MacDonald, Ames, Iowa

In general the types in use now are circular culverts built over collapsible moulds, slab top or box culverts, arched culvert, I-beam construction, including I-beams supporting a concrete floor, and I-beam piling with concrete filled between for abutments and side walls, and steel bridges with concrete floors.

The types of bridges and culverts recommended by the Iowa Highway Commission are as follows:

First. Round culverts built over collapsible moulds with the small amount of longitudinal reinforcement, including all sizes up to a 36-inch diameter. These moulds are on the market in a wide variety of forms. Most of them answer the purpose very well.

Probably the most economical type of small culvert that can be built. These culverts are built over collapsible moulds.

Second. Box culverts or slab bridges from a 2-ft. to a 20-ft. span. Spans longer than 20 feet may be built safely in this type but not economically. In such bridges the slab's thickness much increases with the span and the dead load becomes excessive.

Third. Reinforced concrete arches from an 8-ft. up to a 100-ft. span, built either singly or in series, where the foundation and head room are favorable. The ancients have a saying that the "arch never sleeps." In this type of construction more surely, perhaps, than in any other, the forces of nature, and more particularly the temperature changes are everlastingly at work tending to destroy. Some of the men most enthusiastic over this type of bridge even go so far away from engineering principles that are hereditary, as to declare the uselessness of taking into account the destroying action of temperature stresses. Personally, I am willing to stand upon the principle that all material things are subject to destroying forces and that construction is the most permanent which to the highest degree provides against these forces. Under these conditions, as a general proposition, we do not believe the arch to be the best type of bridge, especially for the shorter span.

30 ft. reinforced through girder with part of the form work still in place.

Fourth. Pony truss steel bridges from 30-foot span to 80-foot span with reinforced concrete floors. To provide an economical, as well as a very substantial bridge, we have designed a series of pony truss steel bridges, carrying a reinforced concrete floor without steel joists. The steel is used in heavy sections and if kept well protected by paint, should be even more permanent than many poorly constructed concrete bridges. This type is particularly adapted to districts that have little or no sand and gravel or broken stone suitable for concrete purposes.

This view shows the plain substantial structural lines to be secured by careful building of the forms.

Fifth. Reinforced concrete girders of either the through or deck type, from a 20-foot to a 50-foot span. For spans ranging above 16 or 20 feet for any given area of water way up to a 50-foot span, the girder bridge is one of the most economical types that can be built. It is not, however, a safe type of bridge to be handled by either the inexperienced designer or contractor, and should only be built with the greatest care in the most painstaking manner.

Naturally the big questions confronting the concrete contractor are, what methods to use in creating a local demand for such structures and what are the big arguments that justify this higher cost of construction.

First in importance, perhaps, is the increased duty that can safely be required of such culverts or bridges. The material is so heavy and substantial that properly built with foundations protected against undermining

Detail of the forms with the wedges

and with flaring wing walls, much smaller water ways may be used than has been the custom with other materials.

Second, perhaps, in appealing arguments, is the idea of safety and permanency. It has well been said that the difference between concrete bridges and most of the other kinds is the difference between an asset and a liability.

Third, if properly figured, the cost of permanent concrete work is not so much above temporary structures. The exact figures for the two kinds at present contract prices in one Iowa county are as follows:

4 ft. x 16 ft. I-beam span wood floor and pile foundation.

1 16 ft. I-beam span	62.40
1 set caps	16.00
Erection	12.00
1.5 M. fir at $33	49.50
140 feet piling at 30c.	42.00
Digging out and hauling	10.00
Anchor bolts	1.00
Cost, not including extras and incidentals	$192.90

One 4-ft. x 4-ft. concrete culvert, 16-ft. roadway, 6 ft. wings, contract price, $169.00.

Cost of temporary I-beam span above that of permanent concrete culvert 14 per cent.

Of course as the length of span is increased, the difference in cost between temporary structures and permanent ones, varies more widely, and when the larger structures are considered, the justification for the increased cost must lie in the greater value received.

Roadway view of steel bridge with concrete floors. The renewal of floor plank is becoming such an item of expense in maintaining highway bridges, that the best economy demands a more permanent type of floor.

There have been no notable failures of concrete work in Iowa during the past year. There are, however, we believe, some serious mistakes being made that will eventually result in failures. The mere fact that a bridge or culvert is standing is no reason for assuming that it is a safe kind of structure to build. Shallow foundations easily undermined; loam mixtures, quickly disintegrated; insufficient reinforcing and rough form work are all contributary mistakes that may end in failures.

Among the costly mistakes that have been most frequently made is that of low bidding. Concrete work is not and never will be cheap work, and concrete workers should not attempt to compete in first cost with bridges of other less permanent material except under very particular circumstances. The fact that concrete work well done is permanent, entailing practically no maintenance charge, should be sufficient to off-set in the minds of public road officers, the somewhat higher investment. We have found that bids on plans prepared by the Highway Commission, and on which the competition has been strong, have almost invariably been below the estimated cost. On the other hand, it is apparent that contracts have been taken at a loss by many concrete contractors, because of the rank favoritism that prevails in so many counties, or on account of the conditions that have been imposed upon contractors which has effectually eliminated competition.

In response to the demand for concrete bridges, the steel I-beam bridge has been encased in concrete and used extensively in some counties. This is a needless waste of steel, as a few rods of steel would reinforce the abutments far more effectively and the prices that have been paid for this material are far in excess of the market value. When used for floors, the I-beams must carry their own weight plus that of the concrete floors plus the loads that pass over them. This is not reinforced concrete construction, and if the I beams are sufficiently large to take the superimposed loads, the cost complete with concrete floor would be considerably more than the slab, reinforced with steel rod.

Type of steel and concrete construction. The floor joists are omitted and the reinforced concrete floor slab spans between floor beams.

There are many mistakes made in concrete construction, due to the incomplete knowledge of the men handling the material or insufficient supervision. Among these mistakes is the misplacing of reinforcing steel. Careless placing of the steel reinforcing is a really serious matter, for in the use of slabs and thin sections, a minimum thickness is nearly always used.

If then the steel is misplaced even one half inch from the normal positions, the calculated stresses will be greatly increased and if in a thin section, the steel is misplaced one inch, then the stresses induced may cause serious cracks or even failures.

Concrete Sidewalk Construction at Verdun, Que.

Upon request for information relative to methods adopted at Verdun for the above work, Mr. Henry Hadley, town engineer, has furnished us with the following:

"A good sidewalk must possess permanency, solidity, evenness and elasticity to resist the action of frost. The writer believes that to overcome heaving by frost the walk must be built with a foundation below frost line or else it must be laid so that the frost will act on the material as a whole. After careful study a pavement consisting of concrete slabs was decided upon as being the most economical and possessing, in a large degree, the essential qualities of a good walk. The width used is five feet on main streets and four feet on side streets, with provision for increasing the width an additional two feet. The materials used consist of a standard cement, the best quality of sand obtainable and a good quality of screened gravel. The foundation is built of yellow clay thoroughly tramped and carefully graded. The clay foundation is extended eight inches on each side of the concrete to prevent slipping and to protect the edges of the walk.

"The method of laying the walk is as follows: Two men lay the forms, which consist of 2-in. x 4-in. lumber, set on edge, to grade pegs given by the engineer. The material is mixed by hand on two boards; two men mix it dry and four men mix it wet. The material is then carried by barrows and dumped into place. One man, who has charge of the gang, lays the walk, spreading the material in place and putting a taper board at right angles to the length of the walk dividing the cement into blocks four or five feet wide and four feet long. The thickness of the cement is four inches. The walk is finished by rounding the edges and dotting the surface with cement tools. This walk possesses the advantage of being easily lifted and replaced. This is necessary in case of excavating under the walk or of settlement. The council have been thoroughly satisfied with this work and the town has laid to date about fourteen miles, which will be increased to about twenty this season.

Waterproofing Masonry

The waterproofing of masonry has been studied during the past two years by the committee on masonry of the American Railway Engineering and Maintenance of Way Association, and the data collected so far are tabulated in the report of that committee to the annual convention. The committee is considering the problem from the point of view of an investigation of methods of treating certain masonry structures to prevent leakage through them, rather than as an investigation of the imperviousness of certain substances. The information collected thus far covers 48 structures of various types on different roads. It seems to the committee that no method of waterproofing has proved entirely satisfactory. Some cases have shown leaks in each of the four classifications adopted in the study, namely, exterior envelopes, materials mixed with the concrete, exterior coatings and concrete without other protecting material. The difference in efficiency between the various classes does not seem to be great, and the credit due to the quality of the masonry does not appear in the data. Failures are evidently due to faulty details, poor materials, poor workmanship and the formation of cracks in the masonry. Dry work seems dependent on careful design of masonry details as well as of the waterproofing. The materials should be placed by skillful workmen, under careful supervision, and reinforcement should be provided against shrinkage and temperature cracks. The committee concludes from the results of its investigation that concrete masonry, properly designed and placed, may be made waterproof without the addition of special waterproofing matedials.

Reinforced Concrete Roads

Reinforced concrete roads have been selected for stretches of 1¼ miles in Harrison County and ¼ mile in Pike County, Ohio. In both cases the work is located on sections that are subject to overflow and it was partly on this account, according to the report of Mr. James C. Wonders, State Highway Commissioner, that concrete was selected. The concrete will be 14 feet wide and 6 inches thick, made in the proportion of 1 part Portland cement, 2½ parts sand and 5 parts gravel; it will be reinforced with No. 11 wire, woven in a 6-in. mesh. The reinforcement will be placed midway between the upper and lower surfaces and the work will be cut in sections 50 feet long. The joints will be at an angle of 45 deg. with the line of the road. The concrete will be a wet mixture and will be rough floated, with a plank template so as to leave a safe footing for horses. An experimental section of this type of road was built in 1909, and Mr. Wonders reports that after a year's use it is in perfect condition and its surface has been very satisfactory.

Sedimentation basin cleaning at the Poughkeepsie, N.Y.,water purification works resulted in the removal of 464.4 cubic yards of sludge from 845,769,290 gal. of Hudson river water. The basin holds about 3,000,000 gal., or 24 hours' supply, was put into commission October 2, 1909, and operated up to June 15, 1910, when the water was drawn off and the sediment removed. The specific gravity of the sediment, as given in the 1910 report of Mr. Robert J. Harding, superintendent and engineer of the Board of Public Works, was 1.183, the total weight 467.6 tons, the total weight of dry material 137.9 tons. The raw water from the Hudson river during the period since the basin has been in service has had an average turbidity of 57.9 parts per million and 1.32 gr. per gallon of coagulant were used, on an average of 14.1 days per month. The sludge deposit amounted to 0.5 cubic yards per million gallons of water, or 0.163 tons or dry material per million gallons. Analyses of the composition of the material showed 83.3 per cent. vegetable matter. The per cent. of the total deposit in the first 1-16 of the basin, which is baffled, was 53.3; in the first 1-3, 70.1; and in the first ½, 83.9. The total cost of cleaning was $149.30.

Two local railway projects have been organized in St. John, N.B. One of these proposes to construct a road from Hartland on the St. John River to Sparkle, a point on the Grand Trunk Pacific and on the Miramichi River, a distance of 40 miles through a fine agricultural country. It is also proposed to build a branch railway from the Canadian Pacific to Southampton in York County, a distance of 13 miles.

Shop Fabrication of Steel Highway Bridges

The Treatment of Steel Through the Various Stages—Its Final Erection in Bridge Work—The Necessity for Careful Supervision*

By L. J. Street, Vice-President Canadian Inspection Company, Limited

"All is not gold that glitters." With equal truthfulness may it be said, "All is not safety though of steel."

Apparently there are a few laymen to whom this latter axiom of truth is unknown, and who are, on the contrary, imbued with the belief that the word "steel" and "life-long strength" are synonymous. Unfortunately an occasional bridge commissioner has such beliefs, and feels himself relieved of much responsibility when the highway bridge ordered is specified steel, provided a low price has been obtained. This low cost feature, which ought to cause him uneasiness, is perverted to a feeling of satisfaction.

Equally unsatisfactory is a bridge commissioner who appreciates the necessity for bridges being carefully designed, and the steel fabrication and erection being properly carried out, but who leaves it to the bridge company to presumably protect his interests in these requirements, while at the same time tying their hands with a contract price much too low to permit the advisable weight and workmanship going into the structure, this price being forced on the bridge company by competition without governing specifications plainly setting out the load requirements, permissible unit stresses, quality of material and class of workmanship. Even with such specifications there is the uncertainty as to whether they are to be strictly enforced or not.

Reputable and well equipped bridge companies are thus often compelled to tender with competitive designs, and low cost as the controlling factor, also frequently in competition with concerns not having the engineering knowledge and mechanical facilities for turning out first class work. Knowing that the contract will likely go to the lowest bidder, they, with great aversion, have very often to tender on a design and class of workmanship which is a standing menace to an otherwise good reputation, and a poor investment to the buyer.

To obviate, or at least lessen, this unsatisfactory state of affairs is a vital necessity, not only from the structural steel companies' point of view, but also in the interest of the public in general, who daily use the bridges along our highways. These bridges are relied on as being safe, but they may possibly prove deficient in strength under the heavy loads supposed to be carried.

As J. A. L. Waddell remarks in "De Pontibus," "County Commissioners might well be made criminally liable for all injuries to persons, and pecuniarily liable for all injuries to property, due to failures of county bridges built during their tenure of office. Of course, if the commissioners could prove that they had taken all possible precautions by having the structure designed by a specialist of established reputation, built by a good manufacturing company, and inspected by first class inspectors during both manufacture and erection, they would be able to relieve themselves from the responsibility; but if they were to do all this no bridge failure could occur, or at least the chances for such an occurrence would be extremely small."

True, under the Good Roads Association system, highway bridge designs are submitted to the Provincial Government Engineer for approval, but failures might still occur owing to faulty workmanship.

The object of this paper is an endeavor to place before those interested a necessarily abbreviated, but to be hoped clear mental picture of the treatment of steel from the time it leaves the rolling mill, its passage through the various stages of fabrication in the structural shop, and its final erection into a bridge at the site. An insight into these various details of construction may show the purchaser that even though his bridge bears that mystic prefix "steel," yet the necessity still exists for having a first class specification governing the work, and an experienced bridge engineer advise on same and see that the requirements are complied with. It is not to be expected that your engineer will personally locate at the bridge works and watch every operation, but he can avail himself of the services of Inspection Companies, who have expert structural steel inspectors located in the various bridge shops for just such contingencies, who supervise every detail of shop fabrication, their charge being only a nominal one—less than fifty cents per ton. These inspection companies furnish experienced inspectors to supervise the erection work of the bridge. The mechanical interests of the buyer are thus guarded just as a lawyer protects the legal interests.

If time would permit it might be interesting to touch on the chemical and physical requirements of bridge steel, as also the rolling of the plates or sections used, but under the circumstances these details must be omitted, and the thread taken up after the steel has been rolled and shipped to the bridge company.

Rusting of Steel from Exposure to Elements.

On the arrival of the steel from the rolling mills, it is usually piled in the open in the bridge companies' stock yard. Here it is that considerable damage may occur by reason of the steel not being protected from the weather, and allowed to get rusty and pitted. Of course where very little stock is carried and steel is newly ordered for the various contracts, this oxidization has not time to affect the steel to any great extent, but in other cases where, to be certain of having steel to fill orders, or where, owing to the fluctuations of the steel market, bridge companies wish to take advantage of a low price, a very large tonnage is stocked and this in some sections may remain unused for two or three years. Unless the steel has been protected on arrival, by a coating of paint or oil, at the end of such time the section in question has deteriorated and should not be permitted in a structure. Some of our bridge companies appreciate this loss, and go to the expense of painting all stock material as it is received in the yard. It is therefore readily seen that precautions should be taken to see that only proper steel is selected from the stock yard.

After bringing in the required steel from the stock yard, the plates and flats are run through horizontal rollers to straighten same, and occasionally by means of side fillers, to line up a bowed plate. This rolling operation is frequently omitted in many shops—by some on account of their not having rolls, and in others by reason of the extra expense. However, it is a very necessary operation and one that should be insisted upon, as it is impossible to properly lay off a buckled plate or one out of line.

During the time that the steel is being brought in from the stock yard and rolled, or previously, the template department is making the wooden or cardboard templet for marking off rivet holes, etc., on the steel. Care should be

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* Read before the Ontario Good Roads Association, March [illegible]

[illegible] that template be flat and without distortion. After the steel has been laid off it is brought to the shears, [illegible] or punched. In the punching out of the rivet holes, close supervision might be given to the condition of the punches and dies to see that the specified clearance is not exceeded, and that both dies and punches are sharp and unbroken, making a cleanly punched hole, with almost parallel sides. As it is naturally easier to punch holes with a large clearance between the die and the punch, occasionally this practice is resorted to with the result that a hole measuring ¾-in. on the top side, tapers to 1-in. or 1 1/16-in at the bottom. Some authorities consider it good practice to punch the holes smaller than the desired diameter and then ream out to the required size, this reaming being intended to remove the crystallized portion of steel around the hole caused by the punching. In addition to removing this crystalization, the reaming, if deferred until the members are all assembled together, has the advantage of correcting any slight inaccuracies in punching, and making the holes in the various pieces assembled together, coincide, giving a uniform space to be filled by the rivet. This makes it considerably easier to secure uniform size of rivet heads and a well filled shank. When holes are not reamed and are eccentric, the rivetters, to get proper results, have to use different lengths of rivet stock to secure uniform heads, and as this entails considerable delay and consequent expense, it is not often resorted to, except under the strictest inspection.

Close Supervision Essential Throughout.

After the various members are laid off and punched, and again straightened, if necessary, to remove distortion caused by shearing and punching, the intended contact surfaces receive a coat of paint, and at this stage also, close supervision is required, as the men in the shop are prone to omit this painting operation, primarily on account of its making the steel awkward to handle with the wet paint, and also on account of its being necessary before applying this paint to take the time to wire and secure the surface to remove foreign matter and loose mill scale.

After assembling the plates and angles going to make up a member, the reaming, if specified, is then done. The member is afterwards placed on the riveting horses or skids, and rivets are driven in the open holes. This operation can be carefully watched, the condition of the riveting dies being particularly noted, both the size and shape of rivet head being dependent on the die. For ⅞-in. rivets, the stock of the riveting die should be at least 2¾-in. in diameter, as dies under this size have a tendency to spread and form shallow-headed, unsightly rivets. If pneumatic rivetters are used, the air pressure should be noted to see that there is sufficient force to properly enlarge the shank of the rivet to the full size of the hole and form the required head. The driven rivets should be carefully gone over with a tapping hammer and tested for tightness. They should also be inspected for shape and line of heads—all loose or otherwise defective rivets being marked to be cut out and replaced. With direct acting hydraulic or pneumatic rivetters, the percentage of defective rivets is very low, but with the "air-gun," or with hand-driven rivets, the rejections will often run up as high as 10 per cent. or 15 per cent.

On the completion of the rivetting, the member is turned over the painters, who should thoroughly clean same with scrapers and wire and hair brushes before painting. In many shops this painting instead of being a preservative operation, appears to be looked upon as merely a coloring device to improve the appearance of the structure. Also, as "a good overcoat covers a multitude of sins" likewise a good coat of paint can often be made to cover numerous defects—open joints and mis-punched holes filled with putty, rolling mill defects filled with paste, etc., all being very nicely concealed. It is only fair, however, to emphasize the fact that this concealment is not countenanced by the bridge shop management but is an attempt on the part of the workmen to hide defects caused by themselves, and which, if admitted to the management, would bring censure and possibly dismissal.

In the case of truss bridges, and where field connections are specified to be shop assembled and reamed in position, the whole truss is assembled lying on its flat, the proper camber secured by opening or closing splice joints in the bottom chord, and then the field connections reamed out. Special precautions should be taken to see that all the top chord and other compression joints are brought into close and even contact, it being customary to face such joints beforehand in a rotary planer. It is also necessary to watch the setting up of members on the rotary planer, so that the planing may be done at exact right angles to the axis of the chord where straight top chord is used, and to the correct bevel in the case of hip joints and sloping top chords.

After the reaming of field holes in the assembled truss has been completed, the various members are matchmarked for the guidance of the field erector, and to ensure the same location in the field as members had in the shop assembling.

Where the bridge steel is being bought at a pound rate, the weighing of the various members should be carefully watched to guard against errors, and in addition theoretical weights of the members should be calculated as a check against the scale weights, the basis of settlement usually being that the scale weights must be within two per cent. of the theoretical calculated weights.

Larger Bridge Shops Have Many Advantages.

To properly equip a structural shop with the necessary pneumatic air system and varied machinery to handle the steel through the above mentioned operations, involves an expenditure of many thousands of dollars, according to the capacity of the shop, and there is a marked distinction between a small jobbing shop with only a punch, a drill and a hack-saw, and an un-to-date structural shop fully equipped with modern machinery. True, the jobbing shop can turn out a light highway bridge, provided they would take the time with the consequent expense, but when they attempt to compete in point of time with larger shops, the quality of work is decidedly affected. Some of these smaller shops, whose names I could mention, do take the time and turn out a very creditable bridge. However, as the larger bridge shops have a skilled staff and an equipment for turning out the heaviest class of railway bridges, and the sky-scraper building steel work, it follows that as this same labor is expended, and the same machinery used on highway bridge work as for the heavier class of work, the larger bridge shops have an advantage over their smaller competitors.

I certainly would not advocate putting the small companies out of business, as competition is truly the life of trade, but these smaller companies should thoroughly understand that the specification they tender on is to be enforced to the letter, and that therefore if they do not possess the skilled labor and machinery to carry out the requirements of the specification, they should spend sufficient money on the necessary extra equipment; but just so long as they are allowed to understand that rotaried compression joints, air driven rivets, and submission of detail working drawings for approval will not be insisted on, just so long will they continue turning out bridge work not in accordance with specifications, and therefore in unfair competition with other bridge companies who comply with the requirements throughout.

The dangerous feature in connection with this kind of competition is that no matter how poor a structure is, once it is erected it stays, and at the most a municipal council will make an arrangement with the contractor for a deduction from the contract price in order to affect a settlement. This also is unfair to other contractors because as a matter of fact the bridge that was specified was not built and the contractors who bid in good faith on the work, and also the general public are deceived, and, we might almost say, defrauded by any council who accepts a structure of that kind. In the case of one span of about 120 feet, I believe not more than one-half of the contract price has been paid, the balance being withheld for unsatisfactory workmanship and non-compliance otherwise with the terms of the specifications.

Erection.

Usually in transporting steel to highway bridge sites, it has to be carried by wagon from the nearest railway siding, often over rough roads, and considerable care should therefore be used to see that the loading on the wagon is properly done, and that long members do not project too far and become bent or otherwise damaged. On arrival at the site, the steel should not be dumped roughly off the wagon, or allowed to become covered with mud, as this foreign matter has all to be cleaned off before final painting, which means a needless expense, and is often a bone of contention with the local painter who usually takes the painting contract from the bridge company after erection, and who does not figure on the cleaning of the steel.

In the erection of falsework on which to place the steel while erecting, especially in the case of long spans, particular attention should be given to the camber blocking, and also to guard against the falsework settling and throwing camber line out. Without the necessary camber being provided for, the various members of the truss will not come together without considerable drifting.

The careful alignment of trusses should be strongly insisted upon and care taken to see that all tension members are well drawn up and compression joints in close contact. It can be readily understood that if a tension member is left in a bowed condition, it is not doing its intended work, and other members taking care of this strain are being overloaded. I know of a case where the end sections of the bottom chords of a highway bridge had a distinct bow, showing that they were not taking care of any of the strain for which they were designed. On investigation it was found that this was caused by the rod diagonals under the floor being screwed up to such an extent that the bridge was actually being carried by the floor system.

Where the roadway is a reinforced concrete slab resting on corrugated sheets care should be exercised in seeing that the bridge stringers are all in a true plane, so that they will all take an equal share of the load and thus prevent cracking of the slab. It is a very common occurrence to note at the end panels of highway bridges, where the stringers rest directly on the concrete stringer seats, that same are very much out of plane even to the extent of ½ in. or ¾-in., in fact I have seen a case where corrugated sheet metal was used over the stringers on which to place concrete floor, where the entire load was bridged over one stringer, which was about ¾-in. higher than the others in the panel. Another point which can well be given attention is that the necessary clearance exists at the expansion end of the bridge behind the shoe plates and the face of ballast wall of abutment. This is not only necessary to provide for the natural temperature expansion of the steel, but it is also useful to provide for the possible slight shoving of the abutment itself where heavy filling is behind it. Of course, when an abutment is designed and built it is not expected that any shoving will occur, but nevertheless the fact remains that in many instances a slight settlement and shove does take place.

When placing truss shoe plates on bridge seats, it should be seen that an even bearing throughout is secured, even bush hammering where necessary. ⅛-in. sheet lead inserted between the bridge seat and the shoe plate is a wise protection.

Preparation of Contact Surfaces.

All contact surfaces of steel before erection should receive a coat of paint, and in the event of winter erection, all ice and snow should be removed from such surface. It can be easily understood that if members are put together with a layer of ice between, no matter how tightly they are bolted together, as soon as a hot rivet is inserted and driven, it melts the snow or ice and causes a loose joint. All joints should be well bolted before any rivets are driven, so that the contact surfaces are brought closely together.

Most of the field rivets in highway bridges are, even at the present day, driven by hand, but unfortunately owing to pneumatic tools being used universally on all large steel erection works, it is forcing hand rivetting gradually into the background, and causing it to become practically a lost art, consequently there are few good hand rivetters among bridge erection gangs, and these are not usually met with on highway erection work. Therefore the rivetting of the highway bridge work has to be supervised by a man thoroughly conversant with the possibilities of hand-driving, and who will not be intimidated or argued into accepting something very inferior, but which is insisted, is the very best than can be given. Hand-driven rivets can be made absolutely as tight, and quite as good appearing as pneumatic-driven rivets.

Much could be said on the placing of concrete deck, but time will not permit the subject to be taken up on this occasion.

One Water Wheel of Greater Capacity than Lachine Rapids

One measure of the strides which Vancouver is making in wealth and population is the rapid growth in the use of electric power in and about that city. The British Columbia Electric Railway Company which has also extensive lighting and power franchises, is now utilizing over 33,000 h.p. from the plant at Lake Buntzen and has in addition a steam auxiliary of 6,000 h.p. in the city itself.

But the demand for electric power is so great that the company has been compelled to make additional provision and has just awarded to the John McDougall Caledonian Iron Works Company, Limited, of Montreal, the contract for another 10,500 h.p. wheel for an extension of the hydro-electric plant. It is known as the Doble-impulse wheel and is specially suitable for high heads. At Lake Buntzen there is a fall of 380 feet, but Doble wheels are in operation under 2,000 ft. head. This is rendered possible by the use of patented needle nozzles, which regulate the flow of water and act as relief valves to prevent undue shock in the inlet pipes.

The McDougall Company built a similar wheel for the Lake Buntzen power house two years ago and it has run without the slightest trouble ever since it was installed. These wheels, though rated at 10,500 h.p., will really deliver over 15,000 h.p. each, which is more than is now derived from the celebrated Lachine Rapids. The comparison will give an idea of their enormous power and capacity and of the magnitude of the B. C. Electric Railway Company's operations. The contract price was in the neighborhood of $50,000.

The Canadian Pacific Railway has completed plans for a [illegible] concrete building to be erected at the Union Depot yard at Ottawa. A number of changes in the yard [illegible] are also planned.

Canadian Contractors and Their Work

The Brandon Construction Company, Limited—Personnel of the Firm, and a Brief Description of one of their Recent Contracts

Of the progressive contracting firms of Western Canada the Brandon Construction Company, Limited, Brandon, Man., is a praiseworthy example. The managing director of this concern, Mr. T. M. Harrington, was one of the pioneers in the field, and the secretary-treasurer, Mr. H. B. Harrington, is doing much to build up for his company a reputation for expeditious and satisfactory construction. Many excellent buildings in the western provinces testify to the ability of the Brandon Construction Company. Among these may be mentioned the Winter Fair building and the McKenzie warehouse at Brandon. Views of the latter building are shown on the opposite page. The McKenzie seed warehouse was the first concrete structure to be erected in Brandon. It has a frontage on Ninth street of 60 feet, by a depth of 120 feet, and is seven storeys high, including the basement, with a brick storey erected on top of the roof slab.

The total height of the building from sidewalk to coping is 91 feet. There were seven slabs erected, the time occupied in their completion being indicated by the following schedule: ground floor, August 4, 1910; first floor, August 19; second floor, August 31; third floor, September 9; fourth floor, September 17; fifth floor, September 23; sixth floor, September 30. The total time occupied in the erection was thus 57 days; deducting eight Sundays leaves 49 working days—an average of about eight days to a storey. This reflects most creditably upon the contractors.

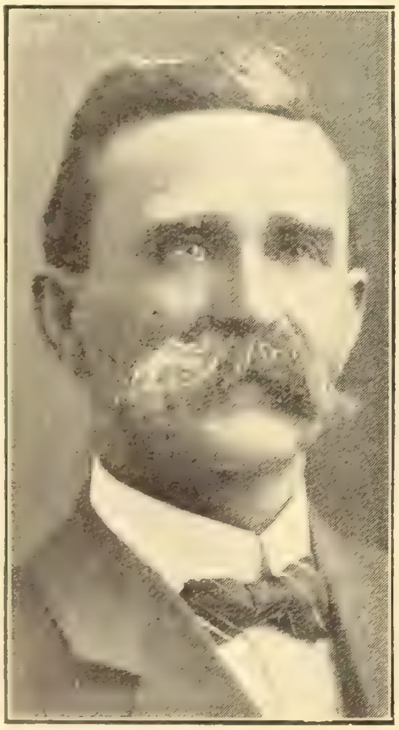
The construction of the building was not unattended by difficulty. This being the first building of its kind erected in Brandon the company were somewhat handicapped in securing the proper class of men to handle the work.

The slab and columns for each floor averaged about 250 cubic yards of concrete. The best time for pouring a slab was 17 hours continuous run. This was accomplished by a No. 2½ Smith mixer used in conjunction with a Smith concrete hoist. Both machines gave splendid service. The "Mushroom" system of concrete was employed. This system was invented by Mr. C. A. P. Turner, of Minneapolis, Minn., who is well known to the architectural profession and building trade throughout Canada.

The columns are octagonal in form and range from 34 inches to 28 inches in diameter. The slab is 9 inches and is designed to carry a live load of 400 pounds to the foot. Provision has been made in the footings and columns for extending the building to 12 storeys. The whole design calls for about 3,000 yards of concrete and about 214 tons of reinforcing steel.

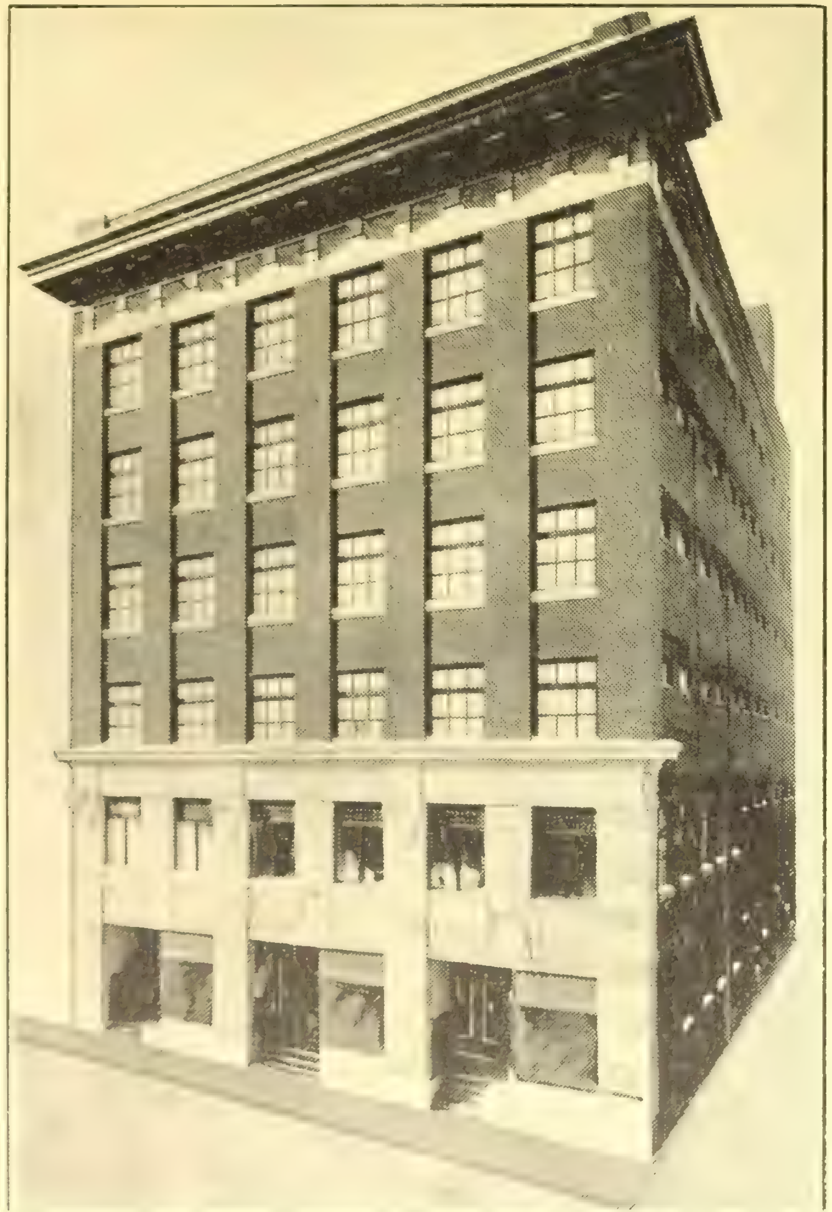
The front of the building is faced on the first two storeys with Bedford limestone and the remainder with red pressed brick, surmounted by a massive copper cornice. The interior trim and doors are finished in copper. The walls are finished in Parisian white with red plastic flooring and marble stairs. There two elevators, one passenger and one freight. The whole building is fireproof, the only wood used being the maple floors in the warehouse. Possession of part of the building was given the owner on December 15. The structure was finally completed and turned over about February 15, 1911.

The building was designed by Mr. Thos. Sinclair, architect, and erected under his supervision. Mr. Sinclair has specialized with much success in reinforced concrete building work.

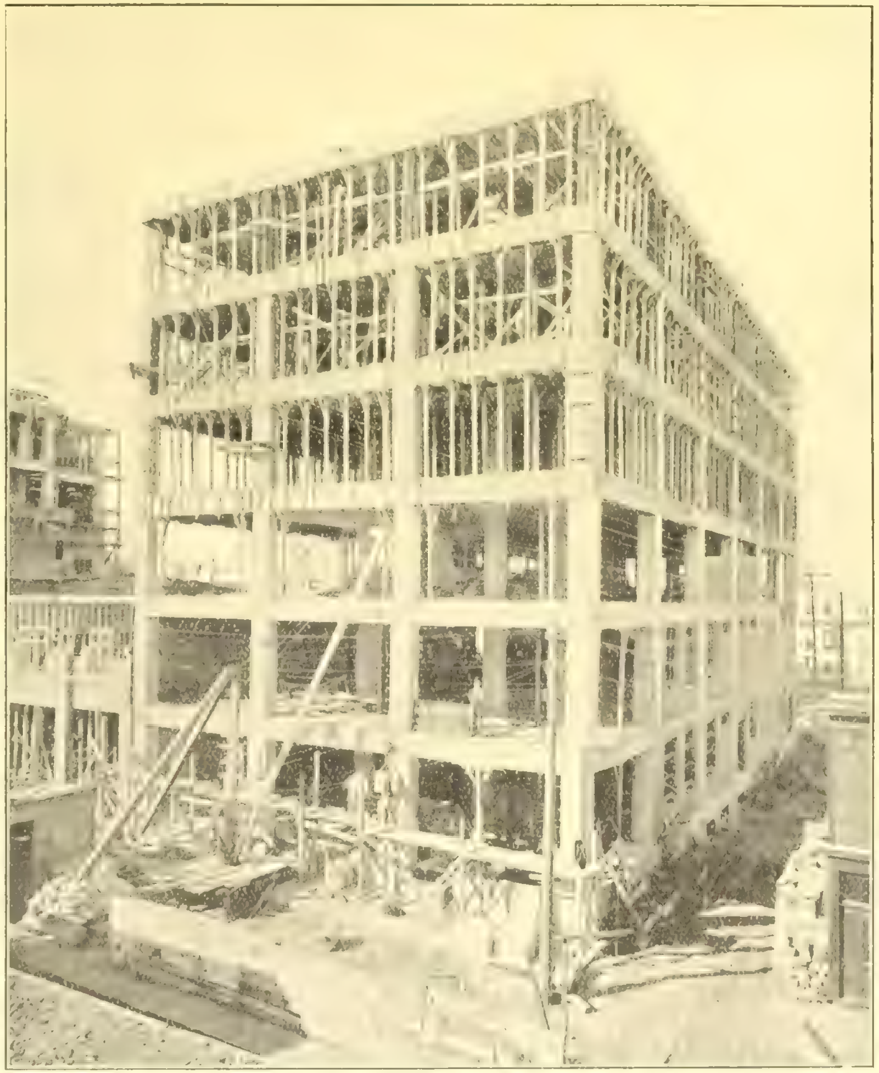


T. M. Harrington.
Managing Director Brandon Construction Co., Ltd.

H. B. Harrington,
Secretary-Treasurer Brandon Construction Co., Ltd



McKenzie Warehouse, Brandon, Man., upon Completion.



McKenzie Warehouse, Brandon, Man., in Course of Erection.

Some Unfair Provisions of Contracts

One-Sided Clauses in Specifications and How They Affect the Contractor Noteworthy Examples on Various Classes of Work

By Daniel J. Hauer *

Contracts and specifications have been written since man first began to live in cities and work in the arts and sciences. The earliest specifications on record are to be found in Genisis, chapter 6. These were prepared for Noah's guidance in building the ark.

"Make thee an ark of gopher wood; rooms shalt thou make in the ark, and shalt pitch it within and without with pitch. And this is how thou shalt make it: the length of the ark three hundred cubits, the breadth of it fifty cubits, and the height of it thirty cubits.

"A light shalt thou make to the ark, and to a cubit shalt thou finish it upward; and the door of the ark shalt thou set in the side thereof; with lower, second, and third stories shalt thou make it."

Noah finished the contract, and his work was accepted, for it is recorded:

"Thus did Noah; according to all that God commanded him, so did he."

The originals of these papers are not on file, but I think we are safe in concluding that they are the genisis of all modern specifications.

Noah carried out his contract successfully and satisfactorily, in spite of, or, perhaps because of, the heavy liquidating damages that were imposed for failure to do so. The contractor of to-day risks his money on unsuccessful performance, but Noah risked loss of money and life by flood if for any reason he should not carry out the terms of the specifications and the contract under which he worked.

Some modern engineers still harp on flood risks. I quote from a set of specifications under which I have done considerable work as a contractor:

The contractor shall take all risks from floods and casualties of every description, and shall make no charge or allowance for such cause.

Unequal Conditions

The contractor must pay for all damage by floods, fires or other acts of God, and yet he has no choice or say in designing or locating the work. A railroad may be located along a body of water, which, in a great storm, may destroy several miles of partly finished roadbed; and the contractor must stand the loss. Again, a partly finished building may be set on fire from an adjoining blast furnace; and the contractor must replace the work at his own expense.

I quote another clause:

No charge shall be made by the contractor for hindrance or delay, from any cause, in the progress of any portion of his work; but it may entitle him to an extension to the time stipulated in his contract for completing the work sufficient to compensate for the detention, to be determined by the engineer; provided, he shall give the engineer immediate notice, in writing, of the cause of the detention.

This seems like an innocent provision. In many cases it is if it is not needed; but let a detention occur, or let the work be suspended, and it may cause the ruin of a contractor. Only recently a member of this society told me of an experience he had had in connection with a clause similar to the one just quoted. He was building a railroad. Besides having on the work a number of sub-contractors, he had some large team outfits of his own. The company suspended the construction work. Settlement was made with the sub-contractors, and the general contractor was asked to keep his outfit on the work. For three months he fed a large number of horses and mules and maintained some of his men. Then the company controlling the roalroad decided not to finish building. The contractor asked for an allowance for his time. It was refused and he entered suit, but was not able to recover because of the presence in the contract of a provision like that referred to. His loss amounted to thousands of dollars.

I again quote from a contract:

Contractors must satisfy themselves of the nature of the soil; of the general forms of the surface of the ground; of the quality of materials required for forming the embankments or other work, and all matters which can in any way influence their contract; and no information upon any such matters derived from the maps, plans, profiles, drawings, or specifications, or from the engineer or his assistants, will, in any way, relieve the contractor from all risks, or from fulfilling all the terms of this contract.

This clause is similar to the following, copied from another set of specifications:

The contractor must examine carefully the plans and drawings and must assume all responsibility for the work to be done under them, and for any omissions or mistakes that may occur in said plans and drawings.

Nothing could be more one-sided and absurdly unjust than such provisions. They surely would not stand in court, yet the responsibility which they shift upon the contractor may work him great injury; as, for instance, in the case of building a concrete house, which collapses during construction owing to faulty design.

I copy this from a set of specifications on railroad work:

Embankments can be made by dumping from grade when carts or cars are used, and in layers when scrapers or wagons are used to make the excavation.

This clause is to be commended, as it provides for work to be done as it is customarily done. What a difference between it and the clauses in a set of specifications under which I worked some year ago, which specified that wheelbarrows must not be used, and embankments must not be built by dumping from grade; but must be built in layers of such thickness as the engineer may direct. These provisions applied to work in mountains, where the embankments were fifty to one hundred feet high, and, in some cases only a few hundred feet long, the hills being difficult to climb. One would think that only an inexperienced man would draw such specifications.

Prohibitive Clauses which Mean Nothing.

Nearly every engineering contract contains a clause reading somewhat like this:

It is agreed that this work, as a whole, or any part of it, shall not be sub-let, without the written permission of the engineer.

Notwithstanding this clause, much work is sub-let, and protest is seldom made by the engineer. It has been my experience that, although much work is sub-let, yet it is the exception when written permission is obtained. Then, why keep such a clause in the contract? It is evidently the idea to allow the engineer to control the situation, that this old clause, entirely prohibiting sub-contracting, is retained.

It would seem to be the better plan to draw up such clauses as govern and control sub-contracting rather than use the one above quoted. Naturally, the engineer and his employer are interested in who is to do their work, and it might be wise to state that a sub-contract is not valid after it is executed, until countersigned by the engineer, or, if such a procedure is not legal, it might be well for the en-

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* Before the American Society of Engineering-Contractors.

gineer to approve the sub-contractor before the work is let to the latter. Any other conditions that are to be met should also be set forth.

The following is copied from a set of specifications for canal work:

> At the end of sluice gate walls, culverts and other designated places, sheet piling 5 feet deep will be required, to be of sound, durable 2-inch plank. A trench will be dug to the proper depth, and the sheet piling set on end therein, and so that the edges will remain in close contact. The trench will then be filled up with stone from the old work, or with rip-rap stone, and the interstices filled with concrete, as directed. The price bid on sheet piling shall cover the excavation of the trench, and the stone and concrete used in rebuilding, as well as the timber and labor.

I might enter into discussion of this clause, showing that timber placed in this manner is not sheet piling, but shoring; and showing, also, that to dig trenches and then to place the shoring, is poor construction, as cave-ins or to the cost of the work. I wish only to call attention to the slides of the material may occur, which will add considerable last sentence. Under this sentence one price is set on four classes of work. This is never desirable. The quantities that are to enter into the work are uncertain, with the exception of the sheet piling. The excavation can be increased by the sides of the trench breaking. The amount of rock to be handled will depend upon the size of the individual pieces as well as the way in which they are placed, and this, too, will govern the quantity of concrete to be mixed and placed. The result of these uncertain features will necessarily compel bidders to name a high price for the work, all of which must be under the head of sheet piling. If each class of work be definitely set forth and a price asked for each, the engineer would no doubt effect a saving for his employers.

Engineer's Decision re Changes in Work.

I again quote:

> The quantities and disposition of excavation, embankment and masonry may be changed during the progress of the work at the pleasure of the engineer, by alterations in grades . . . . it being understood that if by such changes the work is made more or less expensive to the contractor than the plans and statement furnished him by the engineer, and on which he made his proposal, would have required he shall have such allowances or deductions therefor as the engineer may in his own judgment consider just.

Changes can be made under these specifications that may materially affect the cost of the work, and yet only the agent for one party of the contract can have anything to say regarding the prices or allowances to be made. Under these circumstances what is to prevent the entire work from being so changed that none of the original prices would cover the cost of the different classes of work, or to prevent the engineer from naming such prices as suit him? The contractor might as well have the engineer fix his prices at the start.

The same contract states:

> It is mutually agreed and distinctly understood, that the decision of the engineer shall be final and conclusive in any dispute which may arise between the parties to the agreement relative to or touching the same; and each and every one of said parties do hereby waive any right of action, suit or suits, other remedy in law or otherwise, by virtue of the covenants and provisions herein, so that the decision of said engineer, shall in the nature of an award be final and conclusive on the rights and claims of said parties.

This clause only adds to the injustice of the first clause quoted from this contract, giving the engineer the right to change the work at his pleasure and set a new price upon it. By the second clause the contractor is made to bind himself to accept the decision of the engineer, no matter what it may be, as final, and even to sign away his constitutional rights to sue and be sued. Of course, such a proceeding is illegal, and in case of a suit at law the court would set aside this last clause, and would put upon the first a reasonable construction, that is, the price made should cover the cost of the changes in the work.

Surely such clauses and conditions should find no place in a set of specifications and contract made to-day. The idea evidently was to prevent a lawsuit, but such clauses rather foster than prevent actions at law.

Improper Classification

Here is another unfair provision:

> Grading and excavation for the roadbed shall include the grubbing and clearing of the right of way.
>
> Grading shall have but one classification, and that shall be per cubic yard measured in excavation.

Here we have one price covering two classes of work, namely, clearing and grubbing, and excavation. Then the excavation is paid for without classification, which certainly costs the company extra money. I am familiar with one contract done under these specifications, in which there was not a yard of hard material excavated, yet, inasmuch as there were no borings or test pits made prior to the letting of the work, the contractor added a percentage to his price to cover the risk of finding rock, thus making the cost of the excavation greater to the railroad company than it would have been had there been a contract price named for earth, loose rock and solid rock excavation.

There is never any need of including clearing and grubbing in the price of excavation, as there are several equitable methods of paying for this work, and classifying it either as one or two items. Where the excavation is entirely scraper or grader work it is well to classify it as "clearing and grubbing," but should some of the excavation be rock, then money can be saved by a separate price being paid for each, as all the cuts will not have to be grubbed, and in shooting the rock the stumps will be shot out. The engineer should also object to the price of excavation including the clearing and grubbing, for in many cases side tracks and spurs that frequently have to be located after a contract is let, may be through cleared land, yet, as the price for excavation covers the cost of clearing, the engineer's employers pay for it as though it was there. A contractor objects to it, owing to the fact that clearing must be done first, and, as in many section of the country the work is expensive, he is compelled to pay out a large sum of money, the whole of which does not come back until the job is finished. Consequently he must charge interest on the money so paid out, which means a higher price to the railroad for their clearing and grubbing.

Another clause of these specifications says:

> Embankments about concrete shall be built at such times, and in such manner, and of such materials as the engineer may direct.

No one but the engineer knows what he "may direct," and how expensive the work may be made by his directions.

I quote two more clauses:

> The contractor shall indemnify the company from and against all suits and claims of every kind of damage done or caused in the course of construction of work provided for in this contract.
>
> Any damage done by the contractors, or any person in their employ, to the owners or occupants of land or other property adjoining or in the vicinity of the work herein agreed to be done, shall be estimated by the engineer, and the estimated amount shall be paid by the contractors, and upon their failure to do so, the company shall pay the same, and the engineer shall deduct the amount from the ensuing monthly estimates.

In the first clause, as is just and fair, it is stipulated that the contractor shall indemnify the company for all suits and claims for damages; yet, in the next paragraph, the right to settle such claims on terms that the contractor may agree on with the third party is taken away from his hands and [illegible] to the engineer. [illegible] opinion, and the engineer is usurping the inherent rights [illegible]

[illegible] own business, and it would not stand [illegible]. Such clauses are as swords hanging over [illegible]. He cannot afford to combat them when the occasion arises, so he must submit to petty dam[illegible] by the engineer, as the latter deems expedient. It is like the contractor paying for the meal, and some one else ordering it and another eating it.

I copy from another contract governing railroad con[illegible]:

> The engineer shall have entire charge of all forces employed under this contract and shall direct their work and disposition, and shall order such forces increased or diminished, as he shall deem expedient.
>
> The engineer mentioned in these specifications and contract shall mean the engineer in active charge of the work, and it is mutually agreed between the two parties to this contract that his decisions in all matters shall be binding to both parties and shall be final.

The defense of such articles, that they are not enforced, is a poor one, for they should not be written if they are not to be considered in carrying on the work.

At times, though, they are not only considered, but are carried out to the letter, the result being much hardship to the contractor. By these specifications the engineer becomes superintendent for the contractor, and he is clothed with such power as to put nearly every detail of the work and the contractor's entire outfit under his control. Of course this is wrong. The contractor's money is at stake and he should have the exclusive right of handling his forces and outfit as he deems best.

Not only do these clauses make the engineer superintendent of the contractor's forces and outfit, but they state that his decision shall be final in these, and in all other matters, that may come under the contract. Could any contract or agreement be more one-sided and unjust than this? The contractor has but one remedy. He must ask more for the work. This is always the result of such specifications.

Fair specifications and equitable contracts will go a long ways toward making contractors honest, and will ensure the lowest possible prices. Unfair specifications throttle competition, increase the cost and delay the work. A dissatisfied contractor always means trouble.

Reinforced concrete pipe, 36 in. in diameter, was used for 3,480 lin. ft. of sewer at Mishawaka, Ind. The approximate cost per linear foot, as given by Mr. W. P. Moore, city engineer, in a paper before the Indiana Engineering Society, was $4.16. The excavation for the trench was sand and gravel, and the average cut 10 feet. The pipe was furnished to the contractor by the Jackson Concrete Pipe Company at a cost of $1.80 per linear foot, and the charges per foot for labor and material for joints were: labor, $2.25; cement, sand and gravel for joints, 9 cents; water for flushing trench, 2 cents.

Worms and larvae in sewage filters at Chester, England, have appeared in large numbers during the spring and summer, and by their scavenging action are said to clear away the solid matter which accumulates during the colder months to such an extent that the natural color of the filtering material again becomes visible. Last summer, the "Surveyor" reports, birds flocked over the beds in large numbers and devoured the worms and larvae when the latter were most active in cleaning the filtering material. The result is said to have been that the filters have suffered from not undergoing the yearly purging hitherto carried out by the worms.

Trade Enquiries

The Dominion Government Trade and Commerce reports contain the following trade enquiries. Readers of the "Contract Record" may obtain the names of enquirers by writing us, enclosing stamped envelope and stating number of enquiry.

346. **Wire and wire netting.**—A London firm makes inquiry for the names of Canadian manufacturers of wire and wire netting.

350. **Special friction clutch.**—A Danish firm manufacturing a special friction clutch for engineering purposes wishes to arrange for its introduction and sale in Canada.

357. **Wire fencing and fencing standards.**—A South African firm of stock and mercantile brokers desires to be placed in communication with exporters of barbed and ordinary wire fencing and fencing standards.

Tracklaying on the V., V. & E. Ry., northwest from Princeton, B.C., will be started in about two months. At the present time the line is graded from Princeton, 16 miles to Tulameen and it is understood that when the tracklayers begin on the Princeton end to put the rails on the grade, other gangs will continue the grading. Work is being pushed at the western end of the V., V. & E. J. W. Stewart at present has about 150 men on grading operations between Abbotsford and Sumas river. This contract which originally extended to Chilliwack, but which, it is understood, is being cut off at Sumas river to permit the railway company to use Canadian Northern tracks between the river and Hope, is over 60 per cent. completed. It will probably be done in about two months.

Business is particularly brisk at Port Arthur and an active season is assured. The supply houses are busy filling orders for this locality.

An attractive 2-storey structure of red pressed brick and stone trimmings is now being erected for the Canadian National Exhibition at Toronto. It is located south of the Manufacturers' Building and will cost $66,000. Mr. Geo. W. Gouinlock is the architect.

A despatch from Winnipeg states that contracts have been awarded by the Canadian Northern Railway Company amounting to $8,000,000 for the grading to be done on the main line and new branch lines which the company is having constructed in the west this year. The following are the contracts in detail: Cowan Construction Company—200 miles on main line from Edmonton toward Yellow Head Pass; 200 miles from Alsask to Calgary, on the Maryfield extension; 90 miles from Redville to Moose Jaw and Maryfield extension; 35 miles on Jack Fish extension from North Battleford toward Peace River country; 80 miles from Shelbrooke to Battleford. Northern Construction Company—100 miles from Red Deer to Calgary; 20 miles grading and construction on main line from Vancouver toward Rockies

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Editing a newspaper is not a nice thing. If we publish jokes people say we are rattle brained. If we don't we are fossils. If we publish original matter they say we don't give them enough selections. If we give them selections they say we are too lazy to write. If we don't go to church we are heathens. If we do go we are hypocrites. If we remain at the office we ought to be out looking for news items. If we go out then we are not attending to business. If we wear old clothes they laugh at us. If we wear good clothes they say we have a pull. Now, what are we to do Just as likely as not some one will say that we stole this from an exchange. So we did.

Noteworthy Developments at Montreal

Many Important Building and Municipal Projects in hand this Season— Extensive Improvements to the Harbour Work of Legislature Reviewed

Office of the Contract Record,
Montreal, April 1, 1910.

Rumors of strikes are in the air in Montreal. Prospects for building operations here during the coming season are very encouraging so far as the amount of work is concerned, but when there is abundance of work to do, laborers in all departments of the building trade acting on the advice of labor agitators are pretty sure to take advantage of these conditions to demand higher wages and shorter hours. This is the prospect which faces the Montreal contractor at the present time. Millions of dollars' worth of work is in sight. In addition to hundreds of residences and ordinary commercial buildings of every kind there will be office buildings erected within the next twelve months larger than anything hitherto erected in the commercial metropolis.

The greatest danger that threatens the industrial world to-day is the International Trades Union. Most of the troubles that we have in the labor world in Canada are engineered by international trouble makers, so-called organizers, but in reality disorganizers of the most important industries that we are concerned in.

To give some concrete examples: Carpenters are at the present time working for from 22½c. to 30c. an hour with a nine-hour day. 27c. to 28c. represents the pay of the average mechanic and a great many of them are not worth that much. Many so-called carpenters are really only wood butchers and yet the union system encourages incompetency because it secures for a poor workman the same wage as his more skilled brother. This may be considered, when looked at through union spectacles, as an advantage to the journeyman, but in reality the skilled laborer suffers in greater proportion than the unskilled man benefits, whereas the real burden and loss bears heavily on the employer. The carpenters are going to demand 40c. an hour after the first of May. Employers consider that a jump from 30c. to 40c. all at once is too strenuous a demand. The only course for contractors to take is to unite and deal with their employees individually, not permitting agitators to interfere with their affairs. It is simply absurd for carpenters to ask 40c. as a minimum wage for this season's work, and there is every probability that the demand will be refused.

Following the example of the carpenters, the plasterers are asking for a new schedule on the basis of 45c. an hour for an eight-hour day, instead of 40c. an hour for a nine-hour day as at present. The employers suggest a compromise, offering 42½c. for a nine-hour day up to October 1st, and 45c. an hour for an eight-hour day after January 1st. To grant the demands above outlined would mean an additional cost of about 12 per cent. on contracts now entered into. No decision has yet been reached regarding the demands of the plasterers.

There is also some dissatisfaction among the painters who are asking a minimum wage of 30c. an hour. Good men are already getting 30c., but this is too much to give unskilled workmen. The only way to deal with this branch of trade is to stick to the open shop system. In fact "open shop," in which the law of supply and demand regulates the wages, is the only fair method of carrying on building operations.

It is well known in Montreal that some of the unions have not been living up to their agreements and it cannot be denied that bricklayers and others in the east end of the city have been working during the winter at considerably lower rates of remuneration than the union scale. This is looked upon as an unfair discrimination against the English contractors, and moreover shows conclusively that a union agreement is not worth the paper it is written on when the testing time comes. The unions not being incorporated there is no one upon whom the law can lay its hand when an agreement is broken. In the departments of plumbing, painting and carpentering the open shop system has been maintained during the last six or seven years, owing to there being a sufficiency of labor, but in such lines as bricklaying and plastering, owing to the scarcity of skilled labor the unions have been able to exact their own terms. The closed shop is a tyranical institution and the limitation of apprentices is one of the greatest evils existing in the industrial world.

There is room in Montreal for a great many more good class tenement houses. These should be simple in design, medium in size, up to date in sanitation, and not too elaborate in finish, so as to be available for the working classes at a moderate rental.

Grain Elevator No. 2 in course of construction Montreal Harbour Improvement.

Extensive Improvements to Montreal Harbour

The Montreal Harbour Commissioners have ratified plans for the improvement of the harbour which call for the expenditure of two and a half millions. The plans include the construction of grain elevator No. 2, which will have a capacity of 1,[illegible] bushels, also the completion of ten additional miles of high level railway, sidings, etc. Another most important work is the remodelling of Victoria pier, so as to give increased accommodation to ocean liners. The inner side of the remodelled pier will be 4,800 feet long. A concrete ferry wharf, 265 feet long, will be constructed at St Helen's Island.

The construction of high level railways, which was started last season, will be continued this year as far as Racine pier, opposite the Montreal Locomotive Machine Works at Longue Pointe. In connection with this increased railway accommodation there will be 11 steel concrete subways to permit of entry from the harbour to the city.

In preparation for the new elevator, foundations were laid last season for a building 314 feet in length by 100 feet wide, and 230 feet high. Plans were prepared by Mr. John S. Metcalf, the grain elevator expert. The new elevator will have a receiving capacity of 40,000 bushels per hour from boats, and 24 cars per hour, while it will provide the transfers of 45,000 bushles per hour to the liners. In connection with the elevator will be ten and a half miles of rubber belting. There will also be a cleaning plant with a capacity of 3,000 to 6,000 bushles per hour, and a drying plant of 500 to 700 bushels capacity.

There will in addition be completed this season a marine tower jetty or pier 400 feet long of solid cribwork substructure and concrete superstructure, with a quay wall in front of the elevator and a mile of railway tracks connected.

Work in connection with the up-to-date harbour workshops and storage warehouses will be started following the recent purchase of the property between the Dominion Textile Company's Hochelaga mills and the St. Lawrence Sugar Refinery. Sidings will be run from the high level railway into the yard and warehouses, permitting a rapid handling and shipment of the stores.

On Tarte pier, two reinforced concrete sheds, one storey high, will be erected for the South African and West Indies trade, a second storey to be erected later.

Since last season 35 contracts have been awarded for the construction of the new elevator alone. Mr. F. W. Cowie is chief engineer of the Montreal Harbour Commission.

Recent Enactments at Montreal

The Quebec legislature now having closed its annual session, a brief review of its work may be of interest:

First in importance, perhaps, was the enactment which authorizes the city council to proceed with the laying of permanent street pavements at the cost of the fronting properties. In the case of streets in which the roadway is fifty feet wide or less, half of the cost of the roadway will be charged up against the proprietors on either side. Where the street is over fifty feet wide the extra width will be laid at the cost of the city. Montreal has arranged for a loan known as Working Capital, amounting to some $5,000,000, for permanent works of this nature. The cost of the permanent works will come out of this fund, and the frontage proprietors will repay the city by an annual tax covering a period of 40 years. Montreal is one of the last important cities in Canada to adopt this system. Once a permanent pavement is laid at the cost of the proprietors the city must maintain the same in perpetuity; that is to say, all repairs and relaying of worn out pavement must be done at the expense of the corporation. On the other hand, where streets have in recent years been paved by the city it is ordered that when new pavement is next required it shall be put down at the expense of the fronting proprietors.

In accordance with another piece of legislation just passed at Quebec the city council will shortly pass a new by-law relative to cuttings or openings in the streets. Such cuttings have always been a source of contention between the city and contractors and corporations operating public utilities, not to say of annoyance to the citizens. In the case of the Gas Company, electric light companies or others requiring to make excavations for the installation or repair of wires or pipes it has often happened that weeks, and even months elapsed before the filling in was properly done and the surface restored in as good condition as before. Under the new law a deposit must be made with the city covering the amount of the estimated cost of the proposed excavation. The city will have authority and will be obliged to fill in and restore the cutting, including the surface, to its former condition, the cost to be paid out of the deposit made in the case. This will insure the prompt closing up of pavement cuttings and will avoid the annoyance and accidents that have been so frequent hitherto.

Another enactment empowers the city to pass a by-law compelling builders to locate cut-off pipes inside houses. The old method of having the key or stopcock in the sidewalk is very expensive, on account of repairs. The city officials will be authorized, at discretion, to turn off the water and place seals upon the supply.

Strenuous opposition was encountered with the Tramways Bill, which provides for the amalgamation of the Montreal Street Railway Company, the Montreal Park and Island Railway Company, the Montreal Terminal Railway Company, and the Public Service Corporation. The officials of these companies are now taking the necessary steps looking towards consolidation.

Labor Conditions at Winnipeg

Strikes and Rumors Thereof, and Probable Developments—Many Millions to be Expended on New Work

Winnipeg, March 29, 1911.

Railway contractors may be considered as having the centre of the stage at the present time in the Canadian West, and there is feverish activity in the supply field. In addition to the many contracts already let by the Canadian Pacific Railway, the Canadian Northern Railway has awarded contracts for almost a thousand miles of work which will amount to roughly $8,000,000.

Though it will be noticed from the price that this is almost entirely prairie work, still there are several large bridges which will have to be put in and a tremendous amount of grading through rock or partly rock country. It means a tremendous market for supplies of all sorts and should mean a struggle to get enough men and horses to push the work through on schedule time. The Cowan Construction Company and the Northern Construction Company have divided the work between them, but they are preparing to sublet the largest part of the work. With the exception of 200 miles, all of the work is east of the Rockies. Edmonton, Calgary, Moose Jaw, North Battleford and Vancouver will be the chief outfitting points as nearest the various contracts, though much of the preliminary work in this line is being done in Winnipeg.

The English company which is putting in the big irrigation works west of Medicine Hat has also let a big contract for grading recently and this work will be carried on at the same time. It is rumored that this company is being backed to a certain extent by the C. P. R. and their methods of developing the irrigation tract are very similar.

Activity in Real Estate and Building Circles.

But railroad work by no means has the whole of the call, for Winnipeg is awakening in a very positive manner. For the past two weeks real estate circles have been eagerly watching the movements of the Hudson's Bay Company. It was rumored that they were going to change the location of their stores in order to get nearer the heart of the business section. It was finally announced that they were going on Portage avenue, west of the Eaton Company stores. The first work will be the erection of a three-storey building on the frontage between Vaughan and Colony streets and 300 feet in depth. This will be designed to carry five additional stories as they are needed. The effect of this announcement has been startling, and Portage avenue frontage has doubled in value in some instances. Many new buildings along the avenue are being discussed, though the plans as yet are but tentative. Similar improvements in the stores of the company at Calgary, Edmonton, Victoria and Vancouver are under discussion.

There is a lot of work planned in the west which will interest small builders. The Grand Trunk Pacific is preparing to erect 140 new depots along various lines of their system. They will be what is known as the standard type of depot. The necessary lumber and timber has been ordered by the company ready for delivery.

Work on the new Y. M. C. A. building, which will be located on Vaughan street, has been begun, and the contract has been let for the removal of the existing buildings. The excavation will be started at once, and as soon as some minor changes have been made in the plans contracts will be called for the erection of the building. Though the probable price has not been announced it will run into several hundred thousands of dollars.

Business expansion has caused several wholesale firms to consider the building of extensions to their premises. The R. J. Whitla Company have prepared plans for an addition of 40 x 160 feet, eight stories in height. The J. H. Ashdown Company has called for contracts for a warehouse 80 x 134 feet, six stories in height. The Grose and Walker Company will add two stories to their present building, and the Manitoba, Ontario and Western Land Company are planning to remodel the Notre Dame block, with the construction of two additional stories.

The excavation for the foundation of the new power house of the Winnipeg Electric Railway Company is almost completed, and the contractor is rushing the finishing touches on their cooling-water intake which has been carried out into the Red River near the plant. It is expected that piling and masonry work will start there at an early date, and rush orders have been issued for the early completion of the work. The necessary plant has already been ordered. At the new agricultural college, also, excavation has been started and orders for material are now being placed.

In the supplementary estimates brought down by the provincial government the sum of $800,000 is provided for work on the Agricultural College buildings, $300,000 for the Insane Asylum at Brandon and $500,000 for new Parliament Buildings. It is not expected that this latter sum will be called for this year, but the college and asylum will be rushed through.

The Foundation Company, Limited, recently completed the work of sinking the huge concrete foundation pillars for the foundation of the new Dominion Express Building to be erected at the corner of St. James and St. Francois Xavier streets, Montreal. The work has been going on for about two months and has attracted a great deal of attention. Forty-two steel caissons had to be sunk to a depth of from 85 to 90 feet from the surface to the solid rock. Each caisson contained a steel tube and the whole was filled to concrete, making a solid concrete pillar reinforced with steel work. This week the Foundation Company is removing its material, and as soon as the site is clear Messrs. Peter Lyall & Son, the building contractors, will begin the construction of the splendid office building to be constructed on this historic corner this year.

Canadian Railroad Development

The Grand Trunk Pacific Railway is to make surveys for a 25-mile extension of its branch now under construction south from the main line to the Embarrez river. This 25-mile extension will carry the line into the Brazeau coal fields. Phelan & Shirley have the contract for the extension to the Embarrez River and work will be completed in September.

Thomas Malcolm, the contractor, who recently completed the International R. R. from Campbellton, N.B., to Edmundston, has made a proposition to the New Brunswick government on behalf of the Quebec & New Brunswick Railway Company, to construct the St. John Valley road, from Grand Falls to St. John, the line when completed to be leased to the Canadian government and operated as part of the Intercolonial system.

The Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont., is reported to be considering extending its interurban line from a point near Cedar Springs to Blenheim and also on to Rondeau. At present the lake terminus of the line is at Erie Beach. Another development in view by this line is to build a bridge over the river at Wallaceburg with a possibility of still further tapping the country to the north.

The Quebec legislature has granted authority to the Montreal & Southwestern Railway & Power Company to construct an underground railwday terminus in Montreal. The underground route as projected will tunnel the St. Lawrence river from Adirondack Junction, and enter Montreal by underground, establishing a terminus in the central part of the city. The itinerary of the road is through the Counties of Beauharnois, Laprairie, Huntingdon and Chateauguay, starting from Adirondack Junction, on the C. P. R. line, and running southwest along the St. Lawrence to the United States boundary.

The Board of Engineers for the reconstruction of the Quebec bridge have held frequent conferences and have made considerable advance on the modification of the plans of the bridge. The channel span will be between 1765 and 1800 feet in length and the trusses will be 88 feet apart on centers in vertical planes. It has been decided to omit the highways and electric car tracks, thus providing for railway service only and effecting an economy of $2,500,000. This is considered to be amply justified by the fact that electric service is not likely to reach the bridge site for many years and there is no present traffic for roadways unless for sightseers from Quebec.

From the Northwestern Steel & Iron Works, Eau Claire, Wis., we have received a copy of the firm's new 1911 concrete machinery catalogue. This catalogue is replete with information that appeals to us as being absolutely indispensable to the trade. The factory where "Northewestern" concrete machinery is made is built entirely of concrete and is the largest of its kind in existence. During the past three years it has been enlarged three times—a striking proof of the popularity and efficiency of Northewestern concrete machinery. The plant has 100,000 square feet of floor space. Within the past year a large new foundry has been [illegible] the important additions to the manufacturing plant have been made. Contractors will find Northwestern concrete mixing machines particularly worthy of their careful investigation.

Personal News and Notes

The Vancouver Board of Works have submited a resolution recommending that City Engineer Clement be given a bonus of a year's salary, $4,000, upon his retirement.

The Vancouver Board of Works recommend an advance of wage for city laborers, establishing a minimum rate of $[illegible] per day.

At least six firms are expected to tender for the construction of the ships of the Canadian navy. Proposals are to be received up till May 1st, and the correspondence indicates considerable competition. Ten ships are to be constructed, and at Canadian yards.

The Crown Gypsum Company, Limited, are building a new mill at Lythmore, Ont. The plant will be increased to five times its present capacity. The Toronto office of this concern is at 24 Yonge Street Arcade and is in charge of Mr. O. A. Cole, sales manager.

Construction will shortly be commenced upon a modern 6-storey building to be known as the Savoy Hotel at the corner of Yates and Quadra streets, Victoria. The building will contain from 175 to 200 rooms and will be of fireproof construction throughout. Mr. W. D'O. H. Rochfort, Victoria, is the architect.

Vancouver, B.C., is establishing new building records. The permits issued to date in this city for 1911 approximate $3,500,000 in value. Vancouver stood sixth on the list of building totals of American cities for January. The five leading were New York, Chicago, Philadelphia, Los Angeles and San Francisco. Vancouver's increase over January, 1910, was 123.7 per cent., the highest jump recorded on the continent.

Town Engineer Hadley, of Verdun, Que.

Mr. Henry Hadley, Jr., B.Sc., town engineer of Verdun, Que., is one of the youngest, and also, it might be said, one of the most wide-awake municipal engineers in the province of Quebec. He was born in Montreal 27 years ago and educated at the Montreal High School, proceeding to McGill University, from which he graduated in civil engineering in 1906. After graduating he took a post-graduate course, concentrating his studies upon water purification and sanitation. His professional work has been confined exclusively to municipal engineering. He was appointed to his present position at Verdun in 1908.

Mr. B. J. Arnold, a well-known civil engineer and hydro-electric expert, of Chicago, was a recent visitor to Vancouver. Mr. Arnold expressed astonishment at the growth of Vancouver during the last few years and said emphatically that if he were not anchored in the east he would most certainly locate in the Canadian city. As consulting engineer Mr. Arnold has been retained by New York, Pittsburg and other large cities. He is chief subway engineer of Chicago.

Mr. Mason H. Baker, formerly Assistant City Engineer of St. Thomas, Ont., who has now received the final appointment of City Engineer, succeeding Mr. Jas. A. Bell.

Owing to the increased development of their water turbine business in Canada Messrs. Escher, Wyss & Company, of Zurich, Switzerland, have found it necessary to establish an office at 408 Lumsden Building, Toronto, in charge of their chief engineer, Mr. Heyerdahl. In future all enquiries regarding Canadian business should be addressed to Mr. Heyerdahl, who will be pleased to furnish full information and to submit tenders when desired.

The annual bonspiel smoker of the Winnipeg Builders' Exchange was held on the evening of Tuesday, March 28th, in the assembly rooms of the Exchange at the corner of Portage avenue and Hargrave street. Among the donors of cups and prizes were the Carter-Halls-Aldinger Company, the National Supply Company, Limited, the Winnipeg Paint & Glass Company, Limited, the Shipman Electrical Company, Alsip Brick, Tile and Lumber Company, Limited, Gate City Brick Works Limited, Sprague Lumber Company, Stone Wood Flooring Company, Limited, and Allan, Killman & McKay.

According to a dispatch from Winnipeg, that city is on the eve of a period of unexampled activity. Permits for a number of large buildings will be taken out within the next few weeks. In Vancouver, where building operations are well under way, a large number of permits for big buildings have already been issued. Vancouver, so far, leads all Canadian cities, and even leads Seattle, thus realizing one of its great ambitions, but the Winnipeg lists rarely show any great activity until April, though there have been more permits granted this year than for the corresponding period in 1910, when the record for $15,000,000 was made. The officials are confident that there will be more building in Winnipeg this year than ever before.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Berlin, Ont.

Tenders for construction of covered concrete storage reservoir for the Berlin Sewerage Commission are called until April 10th. Plans, etc., at office of H. Johnston, town engineer.

Brandon, Man.

Tenders are called until April 13th for paving, etc., of seven streets. R. E. Speakman, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

The council decided to have the paving prior to the laying of the street railway rails which would cost about $80,000. The Mayor and Alderman McKenzie were appointed as a committee on ways and means.

Chilliwack, B.C.

J. B. Croly, city road superintendent, after a careful inspection of the streets, made his report to the council. He estimates the cost of macadamizing them to be over $66,000. This cost includes the curbing, draining, and paving of streets with rock; engineer's expenses and tools; lumber, nails, gravel, cement, etc., and workmen's insurance. The council is anxious to have the improvements carried out, and a by-law, asking the ratepayers to sanction the floating of a 40-year debenture loan, will be submitted in a few weeks.

Edmonton, Alta.

Tenders are called until May 2nd for supply of material and labor for concrete sewer (10 ft. 6 in.) in internal diameter and about 3,290 feet long. A. J. Latornell, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders addressed to the City Commissioners will be received until April 17th for supply of sewer pipe and fittings. Specifications, etc., at the Stores and Works Department, Kinistino avenue.

Fort William, Ont.

Tenders are called until May 4th for paving with asphalt block, sheet asphalt or bitulithic. Plans, etc., at office of John Wilson, city engineer. Advertisement in "Tenders and For Sale Department" of this issue

Gleichen, Alta.

The waterworks by-law will have to be voted on again. The $36,000 voted on previously was more than the borrowing powers of the town allow, the assessment being $50,000, and the limit of the borrowing powers $35,000.

Lethbridge, Alta.

The cost of the various improvements to be carried out during 1911 is as follows: Street extensions, $5,500; street grading, $52,000; sewer main extensions, $72,000; cement sidewalks, $75,000; water main extensions, $100,000; storm sewers, $41,000; sewage disposal, $70,000; street paving, $103,000; street railway tracks, $10,000; parks, $88,700. By-laws empowering the city to borrow the various sums will be voted upon by the ratepayers early in April.

Moose Jaw, Sask.

Tenders are called until April 17th for supply of water meters. J. M. Wilson city engineer; W. F. Heal, city clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Montreal, Que.

The Montreal Road Department are about to ask the city council to vote $45,000 for tools anl implements such as concrete mixers, stone crushers, steam rollers, and shovels, which will be required in connection with the extensive operations in the line of road and sidewalk improvements to be made during the coming season.

North Battleford, Sask.

On April 10th a vote will be taken on a by-law for $38,000 for waterworks and sewerage extensions.

Oxford Centre, Ont.

Tenders are called until April 10th for construction of the Parking drain in the Tp. of East Oxford, which consists of trenching, laying and covering of 5,212 feet of the drain according to specifications of F. J. Ure; also for furnishing at yard of nearest railway station the following clay tile or second grade sewer pipe; 923 ft. of 14-in. 1,077 ft. of 12-in., and 2,226 ft. of 10-in. and 386 ft. of 7-in. F. G. Jackson, clerk, East Oxford, Oxford Centre.

Prince Albert, Sask.

Tenders addressed to the City Commissioners will be received until April 15th for construction of main intercepting sewer, requiring 5,740 lin. ft., 4 ft. 6 in. x 3 ft.; 4,640 lin. ft. 4 ft. 3 in. x 2 ft. 10 in.; 2,798 lin. ft. 4 ft. x 2 ft. 8 in. concrete sewer, and 19 manholes. Alternate bids for reinforced pipe will be received. Andrew Holmes, chairman.

Port Arthur, Ont.

The Storage capacity of reservoir on Current River will be increased 24,000,000 cubic feet by increasing height of dam 6 feet and replacing the old wooden structure with concrete. The additional storage will give a continuous capacity of 1,000 horse power for two days. Estimated cost is $25,000.

Regina, Sask.

Tenders addressed to the City Commissioners, will be received until April 10th for supply of the following: about 10,000 bbls. Portland cement, 13,000 cu. yds. gravel. L. A. Thornton, city engineer.

Tenders are called until April 15th for supply of one Squeegee street washing machine. A. J. McPherson, city commissioner. Advertisement in "Tenders and For Sale Department" of this issue.

Saskatoon, Sask.

Tenders are called until April 21st for the furnishing of material for water and sewerage works. Jas. Clinkskill and W. B. Neil, city commissioners. Advertisement in "Tenders and For Sale Department" of this issue.

Souris, Man.

Tenders which were received on March 20th for machinery were rejected and new tenders will be received until April 10th for the following: two gasoline or oil engines; 2 pumps, duplex, triplex or turbine; two compression tanks; one air compressor, together with all necessary piping, shafting and belting. Information obtained from town engineer, V. H. Williams; J. W. Breakey, secretary- treasurer.

St. Boniface, Man.

M. P. Blair, city engineer, writes that the bill before the legislature allowing the city to spend the amount of money specified for the reservoir contract recently given to L. Benoit, has been passed. The figure was $32,330. Four firms tendered at $33,398; $34,980; $34,716, and $37,969.

Toronto, Ont.

Tenders addressed to the Chairman, Board of Control, will be received until April 11th for construction of concrete walks on over 15 streets; also sewers on six streets, etc. G. R. Geary, mayor.

Tenders are called until April 11th for the following; concrete paving, hardware, stable fittings. G. R. Geary, mayor. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders addressed to the Chairman, Board of Control, will be received until April 11th for supply of 18 copper screens for the main pumping station shaft, No. 1. Specifications at office of the city engineer. G. R. Geary, mayor. Advertisement in "Tenders and For Sale Department" of this issue.

Vancouver, B.C.

Tenders addressed to Wm. McQueen, city clerk, will be received until May 31st for supply of steel pipe; also for 18-in. flexible joint, c.i. pipe. Specifications at Waterworks Office.

The Waterworks Committee will call for tenders for the delivery of 66,500 feet of water main pipe ranging from 18-in. to 34-in. in diameter to be used in connection with the extension of the Seymour Creek waterworks system. Tenders are to be in by May 31st. By-laws for $200,000 for water systems in Hastings Townsite and D. L. 301 will be submitted. The engineer's report on these districts covered 16 miles of pipe.

Winnipeg, Man.

According to the plan submitted by Col. Ruttan, city engineer, in regard to the [illegible]

[illegible] Smith [illegible]

[illegible] to the Chairman, [illegible] will be received until [illegible] valves for the Domestic Waterworks. Specifications, etc., at offices of city engineer, [illegible] M. [illegible], secretary.

AWARDED

Brantford, Ont.

[illegible] the street paving from Colborne street to the T. H. and B. station, to the Bitulithic Co. Secord & Son get the contract for brick between the Street Railway Company tracks for the distance.

[illegible] & Co.

Port Arthur, Ont.

This city awarded the contract for 100 Trident water meters, four sizes, to Walsh & Charles, Winnipeg, $1,524.15.

Vancouver, B.C.

[illegible] & Evans secured the contract for eighty tons of pig lead at $3.70 per 100 lbs. Robertson, Godson & Co. and Crane & Co. also put in bids. Evans, Coleman & Evans were awarded the contract for supplying steel pipe for water mains, $43,217.85; and Robertson & Godson the tender for supplying valves, $5,062.65.

Crane & Co. were awarded the contract for the supply of eighty Ludlow hydrants at a total price of $3,333.67, the other tenderers being the Canadian Fairbanks Company and Robertson,

Railroads, Bridges and Wharves

Fort William, Ont.

The C. P. R. are planning extensive improvements. The most important will be a coal dock and coal handling plant on Island No. 1. The storage capacity will be 1,000,000 tons coal and will cost $3,000,000 (estimated). Double tracking east will be begun this year. A cleaning elevator will be erected near elevator D.

Headingly, Man.

An appeal is being made to Aime Bernard, M.P.P., and Hon. Robert Rogers for the government to act in the matter of the erection of a bridge on the Assiniboine river here.

Hamilton, Ont.

The Board of Control has received a route plan of the Canadian Northern, showing how its line will run from Bronte to the eastern limit of Wentworth county.

Toronto, Ont.

Tenders for excavation in connection with Jane street subway, West Toronto, are called by the C. P. R. until April 8th. A. L. Hertzberg, division engineer.

The plans of the G. T. R. for its proposed new bridge over Humber river have been approved by the Minister of Public Works, subject to certain conditions, said to effectually guard the public interest.

Winnipeg, Man.

The amended plans of the Midland Railway mean that in the meantime the tracks may come in on the level to Nena street, where there will be a subway, that there will be a subway at Isabel street, that Ellen street will be closed altogether between Ross and Pacific, provision of some kind being made whereby foot passengers may get across the tracks on Ellen street, either by a subway or overhead bridge, and that the company will build a passenger station facing Paulin street. Two of the amended sections in the Railway Act are as follows:

"Any and all railway companies operating or running trains from any point in the United States to any point in Canada.

"The White Pass Railway fought against this amendment, but the Dominion railway board refused to entertain its objection.

"It would appear that if it cannot be successfully contended that the Midland Railway of Manitoba is not in any way, according to the foregoing sections, in foreign control, then it is not free from the power of the board of railway commissioners for Canada.

"Any and all railway companies incorporated elsewhere than in Canada and owning, controlling, operating or running trains or rolling stock or over any line or lines of railway in Canada, either owned, controlled, leased or operated by such railway company or companies, whether in either case, such ownership, control, or operation is acquired by purchase, lease, agreement, control or stock, or by any other means whatsoever.

AWARDED

Quebec, Que.

M. J. O'Brien, the well-known railway contractor, is the successful tenderer for the building of the first section of the Quebec and Saugenay Railway, extending from just below Ste. Anne de Beaupre to Murray Bay, a distance of 56 miles. Later on the road will be extended to the mouth of the Saguenay. Mr. Rodolphe Forget, president. The contract will involve the expenditure of nearly two millions. The road is to be completed by September, 1912.

Public Buildings, Churches Schools, etc.

Altona, Ont.

Tenders are called until April 7th for erection of school here. Plans, etc., at residence of A. Reesor, Altona, secretary.

Brantford, Ont.

Revised plans for the John H. Stratford Hospital have been received from Mr. Green, Buffalo. An entirely new building will not be erected at present. Alterations according to plans estimated to cost about $30,000. Plans will be discussed.

Belmont, Ont.

Tenders addressed to M. L. Holmes, secretary-treasurer, will be received until April 15th for erection of red brick school, S. S. No. 7, South Dorchester. Plans, etc., at office of above or at the home of the architect, N. R. Darrach, St. Thomas.

Brandon, Man.

Tenders addressed to H. Brown, city clerk, will be received until April 6th for work in connection with erection of 5-stall central fire hall station of reinforced concrete construction with exterior walls of pressed brick. Plans, etc., at office of W. A. Elliott, architect. Estimated cost, $30,000.

Comber, Ont.

Jacques & Williamson, Windsor, are preparing plans for a new Presbyterian church here for which tenders are called until May 1st.

Calgary, Alta.

A by-law to expend $45,000 on purchase of fire hall site; also two, $55,000 and $20,000, for construction of buildings in the Exhibition grounds in Victoria Park will be submitted on April 10th.

There will be a referendum vote taken among all the trade unions affiliated with the Trades and Labor Council, in the city, to decide on the project to build a new labor temple. It has been proposed to build a temple to cost in the neighborhood of sixty-five thousand dollars.

Edmonds, B.C.

Reeve Weart and Councillors Rumble and McDonald were appointed a committee to confer with Architect Somerville as to certain alterations to his plans for the $25,000 municipal hall.

Two school by-laws will be submitted to the ratepayers on April 8. No. 1 for $75,000, provides for the purchase of seven new school sites at an average cost of $10,000, also for the provision of school board offices at a cost of $5,000. No. 2 for $8,000, for expenditure in making improvements to the present schools and also for the acquisition of a school site in the vicinity of Capital Hill, at a cost of $2,700.

Eburne, Point Grey, B.C.

Archbishop McNeil has completed negotiations for the purchase of 16 acres on the Shannon road on behalf of the nuns of the Order of the Good Shepherd, Fairview Monastry. Clearing work will be commenced immediately.

Farnham, Que.

Tenders addressed to the Director of Contracts, Militia Headquarters, Ottawa, will be received until April 10th for construction of rifle range here. Plans, etc., at offices of the Officer Commanding the Quebec Command, Montreal and with the town clerk here.

Galt, Ont.

The Lincoln avenue Methodist congregation will call for tenders at once for erection of their church.

Guelph, Ont.

The joint committee of the County Council and the Finance Committee of the City Council decided to recommend the erection of a new jail at a cost of about $20,000.

Tenders are called until April 15th for all trades in the erection of four large buildings for the Homewood Sanitarium here. Plans, etc., at office of the architects, G. M. Miller & Co., Toronto. Advertisement in "Tenders and For Sale Department" of this issue.

Herbert, Sask.

The council have decided to erect a town hall this summer.

Hamilton, Ont.

Stewart & Witton are the architects in charge of the erection of the new 20-room school in the east end. Noted in March 15 issue.

Kingston, Ont.

It is announced that next Fall the erection of a large "union building" for the students of Queen's University, to cost about $75,000, will be started.

Kamloops, B.C.

An administration building, costing $50,000, is to be erected in connection with the Tranquille Sanitarium, Kamloops.

London, Ont.

No decision has been reached as to the erection of joint municipal building.

A new Methodist Church will probably be erected this summer in the north end of the city to replace the present Richmond street North Mission, of which Rev. S. A. Anderson is in charge.

Montreal, Que.

The Directors of the Montreal Arena Company have under consideration alterations and improvements costing about $15,000.

Extensive alterations and an addition of some importance are being planned in connection with the Engineers' Club, Beaver Hall Square. The cost of the improvements will be in the vicinity of $90,000. Messrs. Saxe & Archibald are the architects.

Mr. C. Bernier, architect, Montreal, has called for tenders to be in by April 15th for a new Normal School to be known as the "Couvant de la Presentation" at St. Hyacinthe. This will be a five storey stone structure to cost in the neighborhood of $100,000.

Merritt, B.C.

The Nicola Valley Agricultural Association is considering plans for the erection of a permanent building. The securing of a site for a permanent home has been practically completed. Mr. A. W. Monland, manager of the Bank of Montreal, president.

North Vancouver, B.C.

The by-law for expenditure of $46,000 on schools was carried; also that for city hall additions.

North Burnaby, B.C.

It is stated that the Burnaby school trustees, if the school by-laws receive the assent of the ratepayers, will purchase corner of Howard and Turner streets as a prospective school site.

Newdale, Man.

At a meeting of citizens the project to erect a consolidated school for the district here was endorsed. Estimated cost, $10,000. R. Fletcher, deputy minister of education.

Nelson, B.C.

At the annual meeting of the Kootenay General Hospital a special committee was appointed to look into the question of the erection of a new wing or a new hospital. The estimated cost is $6,000. E. F. Gigot, president; Geo. Johnson, secretary

North Bay, Ont.

The council approved of a free site for the Carnegie library

Niagara Falls, Ont.

The Provincial Directors of the Niagara Falls Hockey & Athletic Club are calling for tenders for sites for skating rink to occupy not less than 125 x 210 feet. E. C. Macfarlane

North Battleford, Sask.

Contracts will be let for the new exhibition buildings in the near future. By-laws to expend $4,000 to buy hospital site for the Sisters of Providence; $4,000 for addition to fire hall, $[illegible] for exhibition grounds and buildings will be submitted on April 10th

Newmarket, Ont.

Tenders addressed to L. G. Jackson, secretary, Methodist Church, will be received until April 15th for masonry, plumbing, carpentering, heating, painting, electric wiring, etc., in whole or in part in connection with the remodelling of church. Plans, etc., at office of G. M. Miller & Co., General Trusts Building, Toronto. Advertisement in "Tenders and For Sale Department" of this issue.

Oshawa, Ont.

A Children's Shelter will be erected here at a cost of about $5,000. Col. Farewell, county clerk.

Orangeville, Ont.

Tenders are called by Public Works Department, Ottawa, until April 18th for electric light fixtures, wiring, etc., for the post office here. Plans, etc., with caretaker, also with Thos. Hastings, postal station F. Yonge street, Toronto.

Owen Sound, Ont.

Tenders addressed to James A. Shields, secretary-treasurer, Bayview, Ont., will be received until April 8th for erection of new school, S. S. No. 11, St. Vincent. Materials, cement, brick, etc.

The council refused to grant a building site for library in park.

Ottawa, Ont.

Mr. A. L. Weeks has been chosen architect for the new First Congregational Church.

The Laurentian Club, 47 Slater street, have under consideration the enlargement of their quarters.

The Ottawa Canoe Club have a new club house at Rockliffe under consideration, to cost about $10,000. G. P. Brophy, commodore.

A new Roman Catholic Church will be erected in the Glebe this summer. The site has already been purchased. The architect has not yet been chosen.

The plans drawn up by Building Superintendent Garnock for the addition to the Mutchmor street school have been approved by the P. S. Board and work will be commenced in about three weeks. Plans for new plumbing in Waller, Kent, Laurier avenue and Slater street schools were also approved at an estimated cost of $4,000.

Port Arthur, Ont.

The following tenders were received for the erection of the addition to the municipal offices:

The appropriation for the erection of this addition was only $12,000. Referred to the Board of Works.

J. L. McRae, $15,150; R. Hamer, $16,825; Seaman and Penniman, $16,369; C. J. King, $18,000, all of Port Arthur.

The council authorized the raising of the sum necessary for the purchase of the site recommended by the Library Board. Work is expected to commence on the erection of the library as soon as the frost is out of the ground

Portage la Prairie, Man.

The Masonic order here will erect a Temple on Campbell street with 36 feet frontage.

Regina, Sask.

The members of Assiniboia Club have decided to erect a new club house on Victoria avenue at a cost of $50,000. An offer of $65,000 was received for their present property.

Regina, Sask.

A building will be erected on the lots in the rear of St. Mary's Church, to be used as a club room for the German congregation. It is understood provision will be made for an auditorium for theatrical purposes.

The plans for the new Methodist College show dimensions 205 x 65 feet, 4-stories; front elevation shows two towers. The materials used are brick, with sandstone trimmings; reinforced concrete used throughout; heating done by high pressure steam from the power plant. Tenders close on the 8th inst. and include the installation of a complete power plant. Brown & Vallance, Winnipeg and Montreal, architects. Noted in last issue.

Revelstoke, B.C.

The Revelstoke Curling Club have decided that a new rink, costing in the neighborhood of $10,000, will be immediately proceeded with. A committee was appointed to secure options on suitable available sites and to secure estimates for a building sufficiently large to accommodate at least six rinks.

South Vancouver, B.C.

The school by-law providing for an expenditure of $260,000 was carried. The passing of this measure entails the grant of $75,000 from the government. The money will be utilized in the purchase of school sites, erecting new schools, etc.

Saskatoon, Sask.

The plans drawn up by W. W. LaChance, architect, for the new Saskatoon Club building, have been approved. Cost is estimated at $18,000. Tenders will be called immediately.

The churches here (Methodist and Presbyterian) are considering amalgamation in their building projects, thus reducing the present required building of six small churches to three large edifices. The matter is under discussion.

The report of Meyer J. Sturm, consulting architect, of Chicago, on erection of hospital, is before the hospital board for consideration. It calls for an expenditure of about $185,000. It is probable that the council will be asked to submit a by-law for that amount.

Strathcona, Alta.

It is stated that the new municipal hospital will be erected on University grounds.

St. Thomas, Ont.

Mr. James E. Wetherell, Provincial Inspector of Collegiate Institutes, in his report states that unless extra accommodation is provided for the classes in the Collegiate here, the government grant will be withdrawn. This will necessitate the expenditure of $25,000 or $100,000, if new Collegiate is built

Toronto, Ont.

Tenders are called until April 15th for all trades required in erection of a hall for the Musical Protective Association. Chas. J. Read, architect, Toronto. Advertisement in "Tenders and For Sale Department' of this issue.

The plan prepared by Mr. Geo. W. Gouinlock, architect, for the new Building for Women for the Canadian National Exhibition Association shows a 2-storey structure [illegible] steel, reinforced [illegible] Home [illegible] at a cost of [illegible]

A site has been purchased by the committee for the erection of a Home for Working Girls on the corner of St. Patrick and [illegible] streets. It is expected that work on the erection of the building will be [illegible] commenced. Miss Drummond, general secretary, Y.W.C.A.

St. Clement's Anglican congregation contemplate the erection of a church and Sunday school building at a cost of $40,000. Plans are being prepared now for erection of a building at a cost of $20,000, which will be extended as the funds warrant. Rev. John Bushnell, rector

The Methodist church has extensive plans for expansion in the near future. Among the proposed plans are a building for institutional work on the corner of Queen and Church streets; the corner of Bond and Queen streets is considered a possible site for the new Book Room, which would be eleven stories, probably. Rev. Mr. Armstrong, pastor of the Metropolitan Church.

Vancouver, B.C.

W. Ridgway Wilson, architect, has prepared plans for the new Drill Hall to be erected on Bay street for the Fifth Regiment.

The tenders for construction of the building at Kitsilano for the Order of Oblates are being called. Father Tavernier is in charge.

A by-law will be submitted for $150,000 for erection of a 6-storey modern office building to be used for city hall purposes on the site adjoining the present city hall. Alds. Enright, Cameron and McMasters are interested.

Tenders addressed to R. C. Desrochers, secretary, will be received until April 24th for construction of examining warehouse here. Plans, etc., at offices of J. E. Cyr, superintendent of Public Buildings, for Manitoba, Winnipeg; W. Henderson, resident architect, Victoria, and at the local post office.

The city council decided to abandon the plan of utilizing the reserve opposite Barnet as a site for the new isolation hospital, and ordered the purchase of two blocks of land in Hastings Townsite for the purpose. Owing to the extra cost necessitated by change of site, a new by-law to raise the money necessary for completion of building will have to be submitted

The city council will shortly be asked to consider the erection of a City Hall building on the old hospital block property on Pendar street between Beatty and Cambie streets. The request will be dealt with in connection with the consideration of the by-law, notice for which has already been given,covering the erection of an office block for civic work at the northwest corner of Pender and Main streets.

Welland, Ont.

New tenders have been asked for the enlargement of the Presbyterian Church here.

The following were appointed on the committee to inquire into the inauguration of a technical school here: Messrs. H. F. Stoddard, G. H. Pettit, Dr. Howell

Wolfville, N.S.

Tenders addressed to R. C. Desrochers, secretary, Public Works Department, will be received until April 12th for construction of public building here. Plans, etc., at office of C. E. W. Dodwell, district engineer, Halifax, at local post office and at above department.

Winnipeg, Man.

The board of control recommend the granting of $15,000 to the Salvation Army for the purpose of erecting a Home. Total cost estimated at $33,000. Brigadier Burdett in charge.

Tenders addressed to the Chairman, Board of Control, will be received until April 12th for supply of all labor and materials required in erection of Tubercular Hospital Building. Plans, etc., at office of Geo. G. Teeter, architect, 604 Builders' Exchange Building. M. Peterson, secretary.

At the semi-annual meeting of the Winnipeg Presbyterian Athletic and Literary Association, it was announced that a company had been formed, capital, $60,000, and that grounds in Winnipeg, will be purchased on which a grand stand and club house will be erected. President, S. H. Smythe; vice-president, T. D. Thompson.

AWARDED

Fort William, Ont.

Russell Bros. have secured contract for construction of addition to Central School, 64 x 145 feet, of reinforced concrete; cost, $74,492.

Ottawa, Ont.

The following contracts have been awarded in the erection of Bethany Presbyterian Church: masonry and brickwork, C. and W. H. Lester; carpentering to C. A. McDiarmid and W. J. Tyndall; plastering to J. A. Campbell; painting to William Howe; J. A. Ewart, architect.

Peterbouorgh, Ont.

Contract for carpentery of Murray Street Baptist Church has been given to McIntyre Brothers., and that for the stonework, Reese and Hawkin. The contracts for other work have not been decided. Architects, Burke, Horwood & White, Toronto.

Regina, Sask.

R. J. Burdette, secretary, Board of Trade, writes that the contract for the new Baptist Church at Regina has been let to Smith Bros. and Wilson, of Regina. Work will commence on the new structure at once and work will be completed on November 1st. The building will cost in the neighborhood of $65,000.

Thorold, Ont.

The contracts for the construction of the Carnegie library are awarded as follows: stonework, Newman Bros.; carpenter work, R. S. Blank; plumbing, A. Riddell & Son; painting and glazing, Grenville Bros.; wiring, Barrett Electric Company. Estimated cost, $10,000; architect, A. E. Nicholson, St. Catharines.

Toronto, Ont.

Tenders for the construction of the new Caledonia Road school were awarded to the lowest bidders as follows: H. Lucas and Son, masonry, $29,971; M. Hutchinson, carpentry, $17,555; J. T. Flowers, roofing, $3,420; Robert Bennett, fireproof flooring, $3,965; W. J. Hadock and Son, plastering, $4,675; Fred Armstrong Co., plumbing, $2,520; J. R. Seager, heating and ventilation, $9,480, Johnston Temperature Regulation Co., heat regulators, $983; making a total estimate to date of $72,669.

Vancouver, B.C.

The contract for the building of the pavilion in Stanley Park was let for the sum of $12,250 and the bandstand for $1,485, both to U. G. Patterson, of Cedar Cottage.

Victoria, B.C.

The contract for supplying desks for the schools of British Columbia has been awarded to Clarke & Stewart, of Vancouver. They will furnish the government with about 1,800 Poragon desks to be delivered to the order of the department at Vancouver or Victoria before the 14th of May next.

Winnipeg, Man.

The contract for the excavation of the foundation of the new central Y.M.C.A. building on Vaughan street was awarded W. J. Holmes. The building is to be 140 x 120 feet and on account of the soft nature of the ground, considerable piling will have to be driven into the soil. At the Y.M.C.A. it was stated that the price agreed upon was by the foot, as some of the piles will have to be driven from 20 to 40 feet into the soil, and that the price varied as to the condition met. J. H. G. Russell, McArthur Building, architect.

Residences

Calgary, Alta.

A large apartment house is to be erected on Sixth avenue east for John Lineham, which will contain 100 rooms and will cost $75,000.

Collingwood, Ont.

W. Shenkman will erect an apartment house on corner of Stewart and Cumberland streets.

Tenders for erection of brick dwelling will be received until April 15th. Plans, etc., at Collingwood Hardware store. J. S. McDonald, proprietor.

Edmonton, Alta.

A building permit was granted to W. B. Poncher, Seventh street, for residence, $9,000.

T. A. Davies is erecting a $11,500 house on Twenty-fifth street, a permit for which has been issued.

Montreal, Que.

Tenders are being called for extensive alterations to the residence of H. W. Blaylock, 616 Sherbrooke street. Saxe & Archibald are the architects.

Ottawa, Ont.

F. Diamend will erect apartment houses on Frank street near Bank.

L. Petegorsky and James Wilson will erect an apartment house on O'Connor street.

Toronto, Ont.

Tenders for erection of residences are called until April 10th. James L. Havill, architect, Toronto. Advertisement in "Tenders and For Sale Department" of this issue.

Winnipeg, Man.

W. F. L. Orris, 385 Elgin avenue, will erect a large apartment house on Carlton street, south of Broadway.

AWARDED

Winnipeg, Man.

G. Howard Aikins has contracted for the erection of a residence at Armstrong's Point, to cost about $16,000. The building will be constructed of cut stone and pressed brick, with stone trimnings. Work on the building will be commenced immediately. F. R. Evans, architect.

Westmount, Que.
Messrs. Saxe & Archibald, architects, for Mr. J. D. Hathaway, who is building a new residence on Aberdeen avenue, Westmount, to cost about $12,000. Contracts have been awarded as follows: masonry, Fussing & Jorgensen; carpentry, U. Pauze; plastering, MacIntyre & Co.; plumbing, W. J. McGuire; roofing, Campbell & Gilday; painting, J. N. Arcand; electric work, the Sayer Electric Company

Business Buildings and Industrial Plants

Brockville, Ont.
Messrs. Delahaye purpose spending about $200,000 on new buildings as additions to their plant.

Claresholm, Alta.
There is a talk of a beet factory being established here; also one at Strathmore and one at High River. The C. P. R. are favoring the project.

Chilliwack, B.C.
The plans for the new Bank of Montreal here awaiting approval of head office, show as the materials, granite and pressed brick; two storeys; size, 32 x 80. G. D. Brymner, manager, New Westminster branch.

Edmonton, Alta.
A permit was granted to R. P. Husel, of the Union Land & Investment Co., for the erection of block, $25,000. Work will start at once.

J. McCulla, proprietor of the King Edward Hotel, will erect a business block to cost about $20,000. H. A. Magoon, architect. Tenders have been called

A building permit was granted for the Tegler building, $120,000. Architect, H. A. Magoon; contractors, W. H. Archibald & So., Winnipeg, Man. Sub-contracts are being let.

It is stated that Theodore A. Burrows, ex-M.P., is considering the installation of two big mills in the country west of this city; one on the McLeod river; and one on the Pembina river. D. B. McDonnell, manager.

It is stated that the Canadian Bank of Commerce has purchased the northwest corner of Second and Jasper avenue and not the National Trust property as generally reported. It is understood that the bank will erect a large block in the near future

It is understood that Nicholson & Son are having plans prepared for a new warehouse on Eighth street; a large wholesale grocery firm of Winnipeg are also preparing to build a large block on Eighth street; Revillon Bros. will commence immediate construction on the wholesale block planned for their property on Fourth street. J. E. Brown, manager

The proposed building for the Great West Saddlery to cost about $100,000, will be erected on Jasper avenue. E. F. Hutchings, Winnipeg, president; R. Hutchings, Calgary, vice-president.

Plans are out for the wholesale warehouse of the Ames, Holden & James McCready Company, to be erected on Third street. A. L. Johnson, Winnipeg, general manager.

The proposition regarding the G. T. Pacific Hotel is said to be considered favorably by the council. It is thought that excavation will start at once on the site on McDougall avenue, on which option has been held. Estimated cost, $1,500,000. Mr. Tait, solicitor, G.T.P.; general manager, Mr. Chamberlain. Regina is spoken of as another favorable location for an hotel.

Fort William, Ont.
Tenders are called until April 5th for erection of freight shed for the C.P.R. Frank Lee, division engineer, Winnipeg.

Kelso, Ont.
The following buildings were destroyed by fire on the 31st ulto.: the Miller House, having 200 rooms; the Bank of Ottawa; the Prospect Hotel; Campbell and Clark's restaurant; Davies & Dunn's store. Estimated loss, $100,000.

Montreal, Que.
The Place Viger Hotel under C. P. R. management will be enlarged and remodelled this spring.

Moose Jaw, Sask.
The Times Company, Ltd., called for tenders until April 3rd for the removal of building, and excavating for their new site.

The council will submit a by-law to raise money to build a hotel which is needed to supply accommodation if before May 1st private capitalists will not guarantee immediate construction for the city. W. F. Heal, city clerk.

Merritt, B.C.
Tie Royal Bank of Canada will install a branch here. Inspector Wright; supervisor of branches, Mr. Crosby.

Newcastle, N.B.
Mr. J. W. Miller, formerly associated with the Miller Tanning & Extract Co., at Milverton, it is stated, will shortly erect a tannery, etc., here, to cost about $125,000.

Nelson, B.C.
J. A. McDonald has purchased a site for his new jam factory, which will be two storeys, 100 x 50 feet.

Owen Sound, Ont.
The by-law for knitting factory will be submitted again to the ratepayers. The date fixed is April 24th.

Ottawa, Ont.
John Brouse will erect a row of stores on O'Connor street.

Cummings Brothers will erect a planing mill at Westboro.

P. Horwood, Taylor and Horwood, architects, have prepared plans for a commercial building for Donald Fraser, to be erected on O'Connor street.

The Dunning Sheet & Metal Works, corner of Electric and Creighton streets, state that they will rebuild their plant recently destroyed by fire, at once.

The C. P. R. called for tenders until April 1st for removal, etc., of houses Nos. 31, 41 and 43, and house in rear of No. 39 Bayview road. J. Y. Caldwell, 99 Bank street, agent.

Pointe aux Tremble, Que.
The sash and door factory of Louis Beaudry and the adjoining building were destroyed by fire on the 29th ulto Estimated loss on former, $30,000

Prince Albert, Sask.
H. H. Ittner is getting out plans for a 4-storey brick building on Central avenue. He will also build a three-storey building on Eleventh street.

Port Arthur, Ont.
L. Walsh is preparing to erect a new coal shed 30 ft. x 250 ft. on the water front. Storage capacity 3,000 tons of hard coal. J. L. McRae is contractor.

Regina, Sask.
The Armstrong, Smyth & Doswell block on Scarth street was damaged to the extent of about $40,000 on the 30th ulto.

St. John, N.B.
The Crosby Molasses Co., Ltd., has secured the Magee property on the Marsh road. Plans are now being prepared for erection of warehouse and it is expected work will be commenced shortly.

Sherbrooke, Que.
We are advised that nothing has been decided as yet as to size, etc., of the new general office for the Quebec Central Railway Company.

Tamworth, Ont.
The Barrie block here was destroyed by fire on the 30th ulto. Estimated loss, $7,000.

Toronto, Ont.
The Wm. Davies Co., Ltd., have purchased the site of the Carlton Street Methodist Church.

Sellers & Gough, furriers, have purchased the southeast corner of Yonge and Dundonald streets; it is also stated that the Home Bank of Canada has purchased the southwest corner of Yonge street and Alcorn avenue.

Messrs. Geo. Wright and E. C. Carroll, of the firm of Geo. Wright and Co., proprietors of the Walker House, have purchased the Caer Howell property on University avenue with a purpose, it is stated, of erecting a first-class hotel, at an estimated expenditure of about $1,500,000. Work will probably commence this summer.

Tenders addressed to F. H. Herbert, architect, 65 Adelaide street east, will be received until April 11th for erection of 6-storey brick, steel and reinforced concrete fireproof building at King and Parliament streets for the Aluminum & Crown Stopper Company as follows: concrete, cut stone and brickwork; reinforced concrete; structural steel; carpenters' work; roofing and galvanized iron work. Plans, etc., at office of the architect.

Vancouver, B.C.
The shingle mill of the Pitt River Lumber Mills Company was destroyed by fire on the 28th ulto. It is stated that the company will rebuild on the same site near the C. P. R. tracks.

The British Columbia Steel Corporation, it is stated, have accepted the plans of the United Engineering & Foundry Co., 1590 Grant street, Pittsburg, Pa., for the steel plant to be erected at Port Mann. The C. N. R. is said to be interested

Victoria, B.C.
The [illegible] proprietor [illegible] Hotel, Chambers street and Queen's avenue, proposes to erect a new hotel to cost about [illegible]

Excavation will commence shortly on

(Continued on page 61)

Tenders and For Sale Department

City of Moose Jaw, Saskatchewan

Main Drainage Works

[illegible] "Tender A" and [illegible] by the undersigned [illegible] p.m., on Monday, April 10th, 1911.

Any tender received after the above-stated time will be declared informal.

Contract "A."

Supplying material for and constructing a Sewage Disposal Plant complete, including Pump House, Sedimentation Tanks and Percolating Filter, also the supply of materials for and the laying of a Trunk Sewer and Water Main.

Contract "B."

Supplying two Electrically Driven Centrifugal Pumps and Auto Starters complete with all piping, connections, etc.

Plans and specifications for Contract "A" may be obtained from the City Engineer, Moose Jaw, upon receipt of a marked cheque for the sum of $25 to be held until the return of plans and specifications, and for Contract "B" plans and specifications will be sent upon request.

The lowest or any tender not necessarily accepted.

I. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 18th, 1911. 9-14

City of Moose Jaw, Saskatchewan

SEWER AND WATER EXTENSIONS

Sealed tenders endorsed "Tender 28," "Tender 29," "Tender 30" and "Tender 31," will be received by the undersigned City Clerk until 8.30 o'clock p.m. on **Monday, April 10th, 1911.**

Any tender received after the above stated time will be declared informal.

Contract 28.—The laying of approximately 30,700 lin. feet of tile pipe sewer, building manholes, etc.

The laying of approximately 29,700 lineal feet of cast iron water main, placing valves, valve boxes, hydrants, etc.

Contract 29.—The supplying of approximately:
29,600 lineal feet of 6-in. c.i. water pipe.
112 lineal feet of 4-in. c.i. water pipe.
132 6-in. cast **iron reverse curves.**
34 6-in. cast iron crosses.
72 6-in. cast iron tees.
29 4-in. oft 6-in. cast iron tees.
28 4-in. cast iron tees.
95 6-in. cast iron plugs.

Contract 30.—The supply of approximately:
28,000 lin. feet of 6-in. vitrified tile sewer pipe.
26,600 lin. feet of 8-in. vitrified tile sewer pipe
5,225 lin. ft. of 10-in. vitrified tile sewer pipe.
1,100 lin. ft. of 12-in. vitrified tile sewer pipe.
25 8-in. tees.
75 6-in. tees.
25 8-in. ¼ bends.
100 6-in. ⅛ bends.
25 8-in. stops.
25 10-in. stops.
400 4-in. to 6-in. increasers.

..Contract 31.—The supply of approximately:
65 6-in. 3-way hydrants.
147 6-in. gate valves.
29 4-in. gate valves.
150 6 in. valve boxes.
29 4-in. valve boxes.
88 manholes, frames and covers.

Plans and specifications for Contract 28 may be seen at the office of the City Engineer, Moose Jaw, and at the offices of the Canadian Engineer at Toronto and Winnipeg.

Plans and specifications for Contracts 29, 30, and 31 will be sent upon request.

The lowest or any tender not necessarily a[illegible]

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.
Moose Jaw, Feb. 24, 1911. 9-14

Steam Shovels

We own and have for sale near Buffalo, N.Y., two Vulcan 75-ton 2½-yard steam shovels; late model, with new extra large boilers and in excellent condition; also one 70-ton. These will stand most rigid inspection and we are offering them at unusually low prices. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle Street,
T.F. Chicago, Ill.

City of Winnipeg

Electrical Distribution System

Tenders For

Switching Equipment

for Substation No. 1

Tenders will be received by the undersigned up to 11 a.m., of **Thursday, April 27th, 1911,** for the supply and installation in Sub-station **No. 1,** on King Street, Winnipeg, of electrical switching equipment for this station. Plans and specifications may be obtained at the office of the Power Engineers, Smith, Kerry & Chace, Carnegie Library Building, Winnipeg.

Each tender must be accompanied by marked cheque for five (5) per cent. of the amount of the amount of tender. The Board reserves the right to reject any or all tenders or to accept any bid which may appear to the City's advantage.

M. PETERSON,
Secretary.
Board of Contorl Office,
Winnipeg, March 27, 1911. 14-15

Bridge Tenders

Sealed tenders addressed to the Chairman, Board of Works, Owen Sound, will be received up till 6 p.m., **Friday, April 7th, 1911,** for the following:

1. 9th Street Bridge—
   (a) Steel superstructure, span 53 ft., width 40 ft.
   (b) Reinforced concrete floor for same.
   (c) Concrete abutments for same.
   (d) Reinforced concrete arch, span 50 ft., width 40 ft.
2. 10th Street Bridge—
   (a) Steel superstructure, span 69 ft., width 66 ft.
   (b) Reinforced concrete floor for same.
   (c) Concrete abutments for same.
   (d) Reinforced concrete arch, span 66 feet, width 66 feet.
3. Removal of old bridge and construction of temporary one.

A certified bank cheque payable to the Treasurer of the Town of Owen Sound for 5 per cent. shall accompany each tender, to be returned in case of non-acceptance, and to be forfeited in case the accepted tenderer declines the contract or fails in the performance thereof.

Plans and specifications may be seen at the office of the Town Engineer.

Tenderers for steel superstructure to submit plans and strain sheets.

The lowest or any tender not necessarily accepted.

J. K. LESLIE, Chairman Board of Works.
R. McDOWALL, C.E., Town Engineer.
Owen Sound, March 7. 1911. 11-14

Tenders Wanted

Tenders for the construction of a covered concrete storage reservoir 62 feet x 31 feet, for the Berlin Sewerage Commission will be received by A. H. Millar up to 6 p.m., **April 11th, 1911, Plans** and specifications may be seen at the office of Herbert Johnston, Town Engineer.

A. H. MILLAR, Secretary.
EPHRAM BRICKER, Chairman,
Sewerage Commission.
Berlin, March 28, 1911. 14-14

City of Winnipeg

Electrical Department

Notice to

Electrical Contractors

Notice is hereby given that owing to the inferior quality of rubber covered wire now on the market having proved unsatisfactory, the City will in the near future call for and insist upon the use of a higher standard.

The specifications are now under consideration and await the final action of the National Code Committee who meet in New York this month.

As the higher grade insulation will of course be correspondingly higher in price than the grade now supplied, this notice is given so that in figuring on new work you may make allowance for same.

F. A. CAMBRIDGE,
City Electrician.
Winnipeg, March 20, 1911. 13-13

Town of Brampton

Pavement Construction

Sealed tenders addressed to the Town Clerk will be received up till 6 p.m., **Monday, April 17 1911,** for the construction of approximately 8,00 square yards of pavement and 3,500 lineal feet of concrete curb and gutter. Different classes of pavement to be constructed are: 1. Asphalt Block; 2. Vitrified Brick; 3. Bitulithic; 4. Bituminous Macadam.

Plans and specifications may be seen at the Town Engineer's or the Town Clerk's Office Marked cheque for $500 or 5 per cent. of tender submitted must accompany each tender.

Lowest or any tender not necessarily accepted

W. M. TREADGOLD, Town Engineer.
W. C. YOUNG, Town Clerk
Brampton, March 21, 1911. 14-1

TENDERS WANTED

Tenders will be received for all trades for extensive addition and alterations to the Methodist Church at Newmarket.

Plans may be seen with L. G. Jackson, Newmarket, or at the office of G. M. Miller & Co., architects, Toronto. Tenders to be sent to either of the above on or before April the 15th inst. The lowest or any tender not necessarily accepted. 14-14

TENDERS WANTED

Tenders for all trades for a residence will be received at the office of the undersigned up to 5 p.m., **Monday, April 10th, 1911.**

JAMES L. HAVILL, Architect,
Mail Building,
King and Bay Streets,
14-14 TORONTO, ONT.

City of Regina

Fire Hall Equipment

Sealed tenders addressed to the City Commissioner, City Hall, Regina, Sask., will be received up to **Monday, April 17th, 1911,** for the following Fire Hall equipment: One Combination Hose and Chemical Wagon, 1,700 feet of Double Jacket Rubber Lined Fire Hose, 2 Hydrant Gate Valves, Two Play Pipes, and other apparatus.

All information will be furnished on application to the undersigned, or to W. White, Chief of the Fire Brigade, Regina.

A. J. McPHERSON,
14-15 City Commissioner.

Department of Railways and Canals

Ontario—St. Lawrence Canals

GALOPS CANAL

Sealed tenders addressed to the undersigned and endorsed "Tender for improving Upper Entrance to Lock No. 28," will be received at this office until 16 o'clock on **Saturday, April 15.**

Plans, Specifications, and Form of Contract to be entered into can be seen on and after March 18th, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places Form of Tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $6,000 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, March 21st, 1911

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 14-14

CITY OF MOOSE JAW

Saskatchewan

Sealed tenders will be received by the undersigned City Clerk for the following supplies until 8.30 p.m. o'clock on **Monday, April 17, 1911:**

Any tender received after the above stated time will be declared informal.

Three hundred ⅝-inch Water Meters.
Fifty ¾-inch Water Meters.
Twenty-five 1-inch Water Meters.
Twelve 2-inch Water Meters.

The lowest or any tender not necessarily accepted.

J. M. WILSON, W. F. HEAL,
City Engineer. City Clerk.

Moose Jaw, March 27, 1911. 14-14

City of Edmonton, Alberta

Sealed tenders marked "Tenders for Trunk Sewer," will be received by the City Commissioners up till 3 p.m., **May 2nd, 1911,** for the supplying of all materials and the construction, in tunnel of a concrete sewer ten feet six inches (10 ft. 6 in.), in internal diameter and approximately 3,290 feet long.

Plans and specifications and all particulars may be obtained from the City Engineer's office, Edmonton, on deposit of a marked cheque for the sum of $25.00, which will be held until the return of plans and specifications. Duplicates of which may be seen at the office of the Contract Record, 220 King street west, Toronto, Ont.

Lowest or any tender not necessarily accepted.

CITY COMMISSIONERS.

A. J. LATORNELL,
City Engineer,
Edmonton, Alta. 14-16

Department of Railways and Canals,

Canada

Ontario—St. Lawrence Canals

CORNWALL CANAL

Sealed tenders addressed to the undersigned and endorsed "Tender for improving Upper Entrance to Lock No. 19," will be received at this office until 16 o'clock on **Saturday, April 15th.**

Plans, Specifications, and Forms of Contract to be entered into can be seen on and after March 18th, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted Bank cheque for the sum of $1,500 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The Cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, March 21st, 1911.

[illegible] 14-15

Applications for Positions

Applications, addressed to the undersigned will be received up to and including **10th April, 1911,** for the following positions in the Harbour Commissioners' Service:

General Foreman;
Crib Construction Foreman;
Assistant Superintendent for the Dredging Fleet;
Cost Clerk and Checker.

Applicants to state age, qualifications and salary expected.

DAVID SEATH,
57 Common St., Montreal, Secretary.
March 31st, 1911. 14-14

CITY OF BRANDON

Street Paving

Sealed tenders marked "Tenders for Paving," will be received by the City Clerk, Brandon, Manitoba, until 12 o'clock at noon on **Thursday, the 13th day of April next,** for paving the following streets in the City of Brandon:

Rosser avenue, Twelfth street to Sixth street.
Pacific avenue, Eleventh st. to Eighth st.
Princess avenue, Tenth street to Eighth st.
Eleventh street, Rosser ave. to Pacific ave.
Tenth street, Princess ave. to Pacific ave.
Ninth street, Princess ave. to Pacific ave.
Eighth street, Princess ave. to Pacific ave.

Tenders are invited for Wood Block, Asphalt Block, Sheet Asphalt, Granitoid, Bitulithic and Vitrified Brick, on 5-inch and 6 inch concrete foundation, or other kinds of pavements.

Proprietors of patented pavements are requested to furnish their special specifications.

An accepted bank cheque for 5 per cent. of amount of tender must accompany each bid.

The lowest or any tender not necessarily accepted.

Further particulars can be obtained from City Engineer's Office.

R. E. SPEAKMAN,
City Engineer's Office, City Engineer.
Brandon, March 31, 1911. 14-14

TENDERS

East Toronto Fire Hall

Bulk tenders, or separate tenders, for the several works mentioned below, in connection with the above building, will be received by registered post only, addressed to the undersigned, up to noon on **Tuesday, 11th April, 1911.**

1. Concrete Paving, etc.
2. Hardware.
3. Stable Fittings.

[illegible] office of the City Architect, City Hall, Toronto

[illegible]

[illegible]

Tenderers shall submit with their tender the [illegible]

[illegible]

[illegible]

[illegible] 14-14

TENDERS WANTED

[illegible] to [illegible] Slatter, the [illegible] will be received until 12 o'clock noon, **Saturday, April 15th, 1911**, for all [illegible] Hall for [illegible] at the [illegible] Road 404 [illegible]

The lowest or any tender not necessarily [illegible]

[illegible] April [illegible] 1911 14 14

TENDERS WANTED

Tenders for all the trades required in the erection of four large buildings for the Homewood Sanitarium, Guelph.

Plans and specifications may be seen at the office of G. M. Miller & Co., Architects.

Sealed tenders to be delivered at the office of the architects on or before the 15th of April.

The lowest or any tender not necessarily [illegible]

G. M. MILLER & CO., Architects,
14 14 Toronto, Ont.

City of Regina

Tenders for

1 Squeegee Street Washing Machine

Sealed tenders addressed to the undersigned will be received until 12 o'clock noon, **April 15, 1911**, for 1 squeegee street washing machine for the City of Regina.

A. J. McPHERSON,
City Commissioner.
[illegible] 14-15

City of Saskatoon

Waer Works and Sewarage Works

Sealed tenders, addressed to the City Commissioners, Saskatoon, and marked as to contents, will be received up to 12 o'clock noon on **Friday, April 21st, 1911**, for the following material:—

Contract No. 89.—Furnishing cast iron pipe and specials.

Contract No. 90.—Furnishing fire hydrants, gate valves, and valve boxes.

Contract No. 91.—Furnishing sewer pipe and junctions.

Contract No. 92.—Furnishing manhole frames [illegible]

Specifications, instructions to bidders, general conditions, forms of tender, and forms of agreement, may be seen at the office of the City Engineer, Saskatoon, or at the office of "The Canadian Engineer," at the following addresses:

Toronto, 62 Church Street.

Montreal, Board of Trade Building.

Winnipeg, Room 315 Nanton Building.

Copies of instructions to bidders, and forms of tender, will be furnished on application to the City Engineer, but copies of plans and specifications will not be furnished.

The lowest or any tender not necessarily [illegible]

JAMES CLINKSKILL,
W. B. NEIL,
City Commissioners.

Saskatoon, Sask.,
March 30th, 1911. 14-15

City of Moose Jaw
Saskatchewan

Sealed tenders will be received by the undersigned City Clerk until 8.30 o'clock p.m., **April 17th, 1911**, for the supply of a Gasoline Traction Engine of not less than 20 h.p., and not more than 25 h.p.

The lowest or any tender not necessarily accepted.

J. M. WILSON, City Engineer.
W. F. HEAL, City Clerk.

Moose Jaw, Mar. 31st, 1911. 14-14

Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on **Tuesday, April 11, 1911**, for the supply of Eighteen Copper Screens for the Main Pumping Station, Tunnel Shaft No. One.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained at the office of the City Engineer, Toronto.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council, or officers of the Corporation of the City of Toronto, or in lieu of said sureties, the bond of a guarantee company, approved as aforesaid.

The usual conditions relating to tendering as prescribed by City By-law must be strictly complied with or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.

City Hall, Toronto,
March 28, 1911. 14-14

City of Toronto

Tenders Wanted for

Construction Equipment

Separate or bulk tenders, on prescribed forms, will be received, by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, April 11th, 1911**, for the delivery of the following:—

(1) Two (2) full circle swing traction steam shovels, one and a quarter (1¼) yard dipper.

(2) Six (6) saddle tank locomotives, 36-in. gauge.

(3) Forty (40) four yard (4 yd.) dump cars, or fifty-four (54) three yard (3 yd.) dump cars, 36-in. gauge.

(4) Four (4) double truck flat cars, 36-in. gauge.

(5) (a) Two hundred (200 tons 30-lb. steel rail.
- (b) Twenty-four (24) No. 5 switch leads.
- (c) Seventy-five (75) kegs of spikes.
- (d) Eighteen hundred (1800) pair of fish plates.
- (e) Twenty (20) kegs bolts and nuts.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and form of tender may be obtained upon application from Department of Railways, Bridges and Docks, City Engineer's Office, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY (Mayor),
Chairman Board of Control.

City Hall, Toronto,
March 27th, 1911. 13-13

BRIDGE TENDERS

Sealed tenders will be received by Jas. Beattie, Esq., Clerk of Wellington County, Fergus, Ont., until 2 p.m. on Wednesday, April 19, for the construction of an 80 ft. concrete arch bridge, 26 ft. wide, with ornamental railing, at Fergus.

Plans and specifications may be seen at the offices of the undersigned.

BOWMAN & CONNOR, Engineers,
36 Toronto Street, Toronto,
and Court House, Berlin, Ont.

JAS. BEATTIE, County Clerk,
Fergus, Ont.

J. A. WILKINSON, Chairman of Com.
14-15 Morriston, Ont.

PAVING

City of Fort William, Ont.

Sealed and endorsed tenders, addressed to the Chairman of the Works Committee, will be received at the office of the City Clerk before 5 o'clock p.m., of **May 4th, 1911**, for the paving with asphalt block, sheet asphalt or bitulithic of -

May street, 46 ft., curb to curb., approximately 5,700 square yards.

Brodie street, 46 ft., curb to curb., approximately 8,400 square yards.

Plans, Specifications and Forms of Tender may be obtained at the office of the City Engineer.

Each tender must be accompanied by a marked cheque for $1,000.

The lowest or any tender not necessarily accepted.

JOHN WILSON,
City Engineer's Office, City Engineer.
Fort William, April 1, 1911. 14-16

Township of North Easthope

Tenders Wanted

Sealed tenders marked "Tenders for Western Drain," and "Tenders for Kichne Drain," will be received by the undersigned up to 2 p.m. on **April 17, 1911.** The council will proceed to consider the tenders immediately after the above hour at the Town Hall, North Easthope.

Plan, profile and specifications can be seen at the clerk's office, Amulree, or at the office of John Roger, O.L.S., Mitchell.

The Western Drain commences on Lot 33, Con. 7, and has its outlet on the Northern Gravel road.

The Kuhne Drain commences on Lot 24, Con. 7, and has its outlet on Lot 38, Con. 2.

A deposit of $100 is required on the Western Drain contract and $200 on the Kuhne Drain contract. Cash or marked cheque.

The lowest or any tender not necessarily accepted.

J. D. FISHER,
Tp. Clerk, North Easthope,
Amulree P.O.

Dated the 3rd day of April, 1911. 14-15

Miscellaneous

Advertisements under this heading two cents per word per insertion.

WANTED — American firm manufacturing dynamos, motors, etc., wants representatives in Eastern and Western Canada to handle a complete line of direct current machines from 3 to 500 kilowatt, besides special electrical and motor equipments for driving printing presses. Apply Box 255, Contract Record, Toronto, Ont. 13-14

WANTED—Large Minneapolis firm manufacturing structural and ornamental iron work wants representatives in Western Canada. Apply E. J. McIntyre, 4059 Perry street, Chicago, Ill. 13-14

Business Buildings and Industrial Plants

(Continued from page 57)

the site for the Savoy Hotel to be erected on the corner of Yates and Quadra streets. The plan prepared by W. D. H. Rochfort, architect, shows a building six storeys high 60 x 120 feet, of steel construction throughout. Dr. S. M. Harman is the owner.

Windsor, Ont.

The Detroit, Belle Isle & Windsor Ferry Co. purpose erecting a large warehouse beside the present customs office to cost about $15,000. Tenders are being called.

Woodstock, Ont.

Libby, McNeil & Libby will not locate here this season as at first anticipated.

Welland, Ont.

Coincident with the report from Chicago regarding the merger of wagon and agricultural implement manufacturers, is one that Deer & Company, by which the consolidation will be known, will build here and manufacture other lines of farm machinery besides plows. The headquarters of the concern are at Moline, Ill. Noted previously.

Winnipeg, Man.

F. R. Evans is the architect for erection of the additional buildings proposed by D. Ackland & Son, 73 Higgins avenue. Two new warehouses will be erected.

Tenders addressed to J. A. Hudson, architect, 608 Builders' Exchange, will be received until April 8th for erection of store and apartment block for Mr. H. R. Shaefer.

Tenders addressed to Frank R. Evans, 506 Somerset Block, Portage avenue, architect, will be received until April 6th for erection of addition to the Enright Building on Jarvis avenue. Plans, etc., at office of architect.

Peter Lyall & Sons, on behalf of an English syndicate, have asked for a building permit for a 16-storey building to cost one million dollars, on Main street between Notre Dame avenue and Water street, the site being 150 feet on Main, with 200 feet depth to lane.

AWARDED

Brandon, Man.

The contract for a three-storey business block for Mr. J. Burchill has been awarded as follows: general contract, A. F. Bullock; heating, plumbing, etc., the Brandon Heating and Plumbing Co. Cost of building, $14,500. Shillinglaw and Marshall, architects.

Espanola, Ont.

The Spanish River Pulp and Paper Company have awarded the contract for the pumps for their new million dollar mill to the John McDougall Caledonian Iron Works Company, Limited, of Montreal. The contract includes two 10-in. turbine pumps for the water supply; one 6-in, turbine pump for fire purposes; two 8-in. pumps for carrying off the white water; and two 10-in. turbine pumps for carrying the ground wood stock.

Toronto, Ont.

Contract was awarded to A. B. Ormsby, Limited, for the galvanized iron, windows, doors and roofing work on the Wilson Lytle & Badgerow factory.

Power Plants, Electricity and Telephones

Brandon, Man.

The provisional plan of the street railway prepared by City Engineer Speakman, was adopted by council. It was decided to submit a by-law for $300,000 for construction of the road. Noted in issue of March 29th.

Brantford, Ont.

It is stated that the bill providing for an electric road from Port Dover to Galt via Brantford has passed.

Edmonton, Alta.

The industrial committee of the city council will grant a gas franchise to the International Heating and Lighting Co., of Cleveland, Ohio. The maximum price was fixed at $1.65 per thousand cubic feet. The agreement between the city and company will be submitted to the ratepayers in the course of a few weeks.

Hamilton, Ont.

The city council ratified the appointment of E. J. Sifton, London, as an expert to draw up plans, etc., for a municipal light and power plant.

Hull, Que.

City Engineer Chene is preparing estimates of the cost of erection of a number of lamps similar to those in use in Ottawa for lighting the streets.

London, Ont.

..It will be necessary to purchase two new transformers for the Niagara power station on Horton street. Superintendent Glaubitz.

Lethbridge, Alta.

It is proposed to commence operations on a street railway system which will require the supply of new boilers, alternating - current generating unit, about 1,500 k.v.a. capacity, and a rotary converter set. Arthur Reid, superintendent.

Moncton, N.B.

The ownership of the Electric & Gas Lighting plant has passed over to the Moncton Tramways, Electricity & Gas Company. Work on the installation of natural gas supply and street railway will be commenced as soon as frost is out of the ground. Mr. Sumner, vice-president; O. P. Boggs, manager. Noted in issue of March 15th.

Montreal, Que.

Property at Cedar Rapids capable of generating, it is estimated, about 150,000 h.p., has been purchased by D. Lorne McGibbon, who is said to be closely identified with the Canadian Light & Power Co., Beauharnois. It is anticipated that about $4,000,000 will be spent in development work.

Oak Bluff, Man.

The citizens will ask the council for its support in the arranging for a street car service for the municipality.

Ottawa, Ont.

The street railway extension committee will recommend to council that the street railway line be extended to the cemeteries by St. Patrick street. By having a single track no bridges would need widening and the grading, etc., would cost about $11,500, while to go by Montreal road, two bridges would be necessary, which would cost about $70,000

Portage la Prairie, Man.

Negotiations are stated to have been opened with Winnipeg for the purchase of about 3,000 h.p. from the new power plant at Point du Bois.

Port Arthur, Ont.

The street railway will be extended from High street to Algonquin street on Red River Road, 4,000 feet, as soon as material is received.

Sturgeon Falls, Ont.

The report on the supplying of electric power and lighting and water, estimates the outlay for such at $50,000. The money is not on hand for such an expenditure and the council are considering the advisability of arranging with some company to erect a pumping station, the council to have the option of purchase when practicable.

St. Vital, Man.

Work will begin this spring on the municipal electric railway here.

Saskville, N.B.

Local men with backing, it is reported, are about to become owners of the N. B. and P. E. I. Railway, running from here to the Straits of Northumberland, and will put on electric cars.

Toronto, Ont.

The Ontario Railway and Municipal Board have approved of the construction of loop on Louisa street.

Tenders addressed to G. R. Geary, Chairman, Board of Control, will be received until April 11th for transformers for the hydro-electric system. Specifications obtained from the Toronto Hydro-Electric System, City Hall.

The Ontario Government is considering, though it has not definitely decided, to extend the Hydro-Electric power line from St. Thomas to Windsor, and to spend $2,000,000 on the work. The extension from St. Thomas to Windsor will be 128 miles long, with about 400 miles of high-tension wire. The proposed line will supply a number of municipalities between the two cities. The Hydro-Electric Commission arranged with the New York and Ontario Power Company to supply power for the Eastern municipalities, such as Napanee, Kingston, Lansdowne, Brockville, Lynn, Prescott, Cardinal, Morrisburg, and Athens. Prices and other details will be laid before the Eastern Municipalities' Power Union at a meeting to be held in Brockville or Kingston. In the north, the commission has closed a contract with the Simcoe Power Company, and the power will be transmitted to Penetanguishene, Midland, and Waubaushene.

Winnipeg, Man.

Tenders addressed to the Chairman, Board of Control, will be received until April 10th for erection of stepdown transformers and accessory equipment for pumping station. Specifications, etc., at office of City Engineer. M. Peterson, secretary.

It is likely that several important extensions will be established during the season, including those of rural telephones on the Government telephone lines. F. C. Paterson, Chairman, Manitoba Government Telephone Commission.

Tenders are called until April [illegible] for supply and installation in sub-station No. 1, King street, of electrical switching equipment. M. Peterson, secretary, Board of Control. Advertisement in "Tenders and For Sale Department" of this issue.

AWARDED

Quebec, Que.

The Quebec Railway, Light, Heat and Power Company have awarded the contract for the construction of the new branch of the line from Beauport to Kent House, to Lonergan Bros., of this city.

Miscellaneous

Brantford, Ont.

Tenders addressed to E. P. Worthington will be received until April 8th for erection of business block. Plans, etc., at office of the architect, Geo. W. Hall.

Calgary, Alta.

Tenders are called until April 15th for erection of solid brick business block on Seventh avenue east for the Alberta Loan and Investment Co., Ltd. Hodgson, Bates & Butler, architects, Grain Exchange Building.

Fergus, Ont.

Tenders are called until April 19th for bridge here. Bowman & Connor, engineers. Advertisement in "Tenders and For Sale Department" of this issue.

Galt, Ont.

Tenders addressed to Joseph McCartney, town clerk, will be received until April 17th for Portland cement, lumber, hardware, castings, sand and gravel required for 1911 by the board of works.

Grandview, Man.

This municipality will spend about $4,500 in the purchase of fire equipment.

Moose Jaw, Sask.

Tenders are called until April 17th for supply of gasoline traction engine, etc. J. M. Wilson, city engineer; W. F. Heal, city clerk.

Ottawa, Ont.

Tenders addressed to the Chairman of the Ottawa Improvement Commission were called until April 3rd for supply of the following: hardware and explosives, lumber, shingles, coal.

Tenders are called until April 15th by the Department of Railways and Canals for improving upper entrance to Lock No. 19, Cornwall Canal. Secretary, L. K. Jones. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders for improving upper entrance to Lock No. 28, Galops Canal, St. Lawrence Canals, will be received until April 15th by the Department of Railways and Canals, L. K. Jones, secretary. Advertisement in "Tenders and For Sale Department" of this issue.

The Dominion Department of Public Works has awarded the following contracts: Maritime Provinces, 15-inch suction dredge, to la Cie Pontbriand Ltee., of Sorel, Que., for $59,865; Annapolis Royal, N.S., ice piers, to E. R. Reid, of St. John, N.B., for $37,200; Ottawa, Victoria Memorial Museum, screens, partitions, pedestals, etc., for sculpture galleries, to George Goodwin, of Ottawa, for $8,000; St. John, N.B., installing lighting system in No. 6 extension and No. 7 warehouse, to Vaughan Electric Co., Ltd., St. John, N.B., for $1,361.94; Listowel, Ontario, public building, to John Avery, of Mitchell, Ont., for $21,195; London, Ont., addition to military stores building, to John Burdon, of London, for $2,182; Tillsonburg, Ont., public building, to Shultz Bros. Co., Ltd., of Brantford, for $24,801; Battleford, Sask., public building, interior fittings, to Berlin Interior Hardwood Co., Berlin, Ont., for $2,225; Nelson, B.C., public building, alterations and additions, to John Burns and Sons, of Nelson, for $9,300; Victoria, B.C., assembling and erecting Victoria rockbreaker, to the Victoria Machinery Depot Company, for $12,150; Sidney, N.S., customs office, fittings, Chapel Brothers and Co., Ltd., Sidney, for $400; Harriston, Ont., public building, to George A. Proctor, of Sarnia, for $18,943; Vernon, B.C., public building, heating system, to Colbert Heating and Plumbing Co., Ltd., Victoria, B.C., for $2,135; Montmorency County, Quebec, pier, to Clouthier and Gaudeau, at itemized prices, approximating $9,237.33.

Quebec, Que.

Tenders addressed to Aug. Malouin, secretary, fire committee, will be received until April 18th for a fire engine, capable of throwing 800 gals. of water per minute, with an intake straight pull of 30 feet without a syphon, and guaranteed for five years.

Regina, Sask.

Tenders are called until April 17th for fire hall equipment, etc. A. J. McPherson, city commissioner. Advertisement in "Tenders and For Sale Department" of this issue.

St. Vital, Man.

Tenders addressed to V. Mager, reeve, Box 1372, Winnipeg, will be received until April 10th for clearing and grading Kingston Row from St. Mary's Road to Suffolk avenue. For further information apply to R. Wilson, care Hudson Bay Company, Winnipeg. E. A. Poulain, sec.-treas., Riel, P. O.

Scott, Sask.

Tenders for drilling a deep well for the Waterworks System here will be received until May 1st. Geo. M. Phillips, secretary-treasurer.

Tp. of North Easthope, Ont.

Tenders are called until April 17th for drains. J. D. Fisher, Tp. Clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Toronto, Ont.

Tenders addressed to G. R. Geary, will be received until April 11th for freight and passenger elevator at Electrical Sub-station on Duncan street. Specifications at the Toronto Hydro-Electric System Offices, City Hall.

Yorkton, Sask.

Tenders are called until April 15th for construction of about 75 miles of rural telephone line in this district. Tenders for work and material separately. W. R. Cowan, Yorkton, Sask.

New Companies

Robertson Paint and Varnish Company, Limited, Toronto, incorporated, capital, $100,000. Incorporators, J. A. Robertson, A. A. Robertson, and C. M. Robertson, Montreal, manufacturers.

Canadian Automatic Heating and Refrigerating Company, Limited, Windsor, capital, $250,000. Incorporators, T. W. Brown, commercial salesman, C. Wright, Jr., attorney, and R. G. Hake, insurance agent, all of Detroit, and F. C. Kerby, barrister, Windsor, Ont.

Sun Brick Company, Limited, Toronto, incorporated, capital, $200,000. Incorporators, F. W. Booth, bookkeeper; W. Booth, lumberman, and W. A. Werrett, solicitor, all of Toronto.

The Onodaga Oil and Gas Co., Ltd., Brantford, incorporated, capital, $90,000. Incorporators, J. H. Spence, manufacturer; R. E. Ryerson, merchant, and W. A. Hollindrake, barrister, all of Brantford.

The Orford Building & Supply Company, Limited, Highgate, Ont., incorporated, capital, $40,000. Incorporators, W. L. Tape, Orford, farmer, D. Paterson McPhail, physician, Highgate.

McFarlane-Douglas Company, Limited, Ottawa, incorporated, capital, $300,000. Incorporated to take over the business carried on by McFarlane & Douglas, Limited, manufacturers of and contractors for architectural and other sheet metal building material, etc. Incorporators, T. D. McFarlane, manager, J. R. Douglas, superintendent, and T. A. Beament, barrister, all of Ottawa.

La Compagnie Hydraulique Stadacona, Quebec, Que., capital, $1,000,000; incorporated to manufacture or distribute, etc., electricity. Incorporators: L. H. Gaudry, merchant; Adjutor Potvin, merchant; P. E. Bernier, advocate, all of Quebec.

The Accumulator Lighting Company, Limited, Winnipeg, Man., incorporated, capital, $50,000. Incorporators, A. R. Sutherland, agent; T. Froggatt, manager; J. D. Suffield, barrister, all of Winnipeg.

The General Machinery Company, Limited, Toronto, incorporated, capital, $40,000. Incorporators, H. H. Williams, manufacturer; B. W. Folger, E. L. Middleton, barristers, all of Toronto.

Canadian Moloney Electric Company, Limited, Windsor, Ont., incorporated, capital, $150,000. Incorporators, D. McKenzie, hotel keeper; J. W. Hanna, barrister, and O. Nantais, real estate dealer, all of Windsor, and J. J. Mullen, St. Louis, Mo., manufacturer.

The Carette-Kirk Co., Ltd., St. Boniface, Man., capital, $50,000; incorporated to carry on the business of plumbers, steam and gas and hot water fitters, etc. Incorporators, C. D. Kirk, superintendent; J. A. Charette, metal worker, and W. Glass, plumber, all of Winnipeg.

The Acme Electric Appliance Co., Limited, Brantford, Ont., incorporated, capital, $300,000. Incorporators, G. Brereton, fruit dealer, and O. M. Mackie, promoter, both of Hamilton, A. Sheard, Brantford, and N. G. Patterson, Cambridge, Ohio.

Standard Struction Co., Que., have registered.

Brennan & Cairnie, contractors, Montreal, have registered.

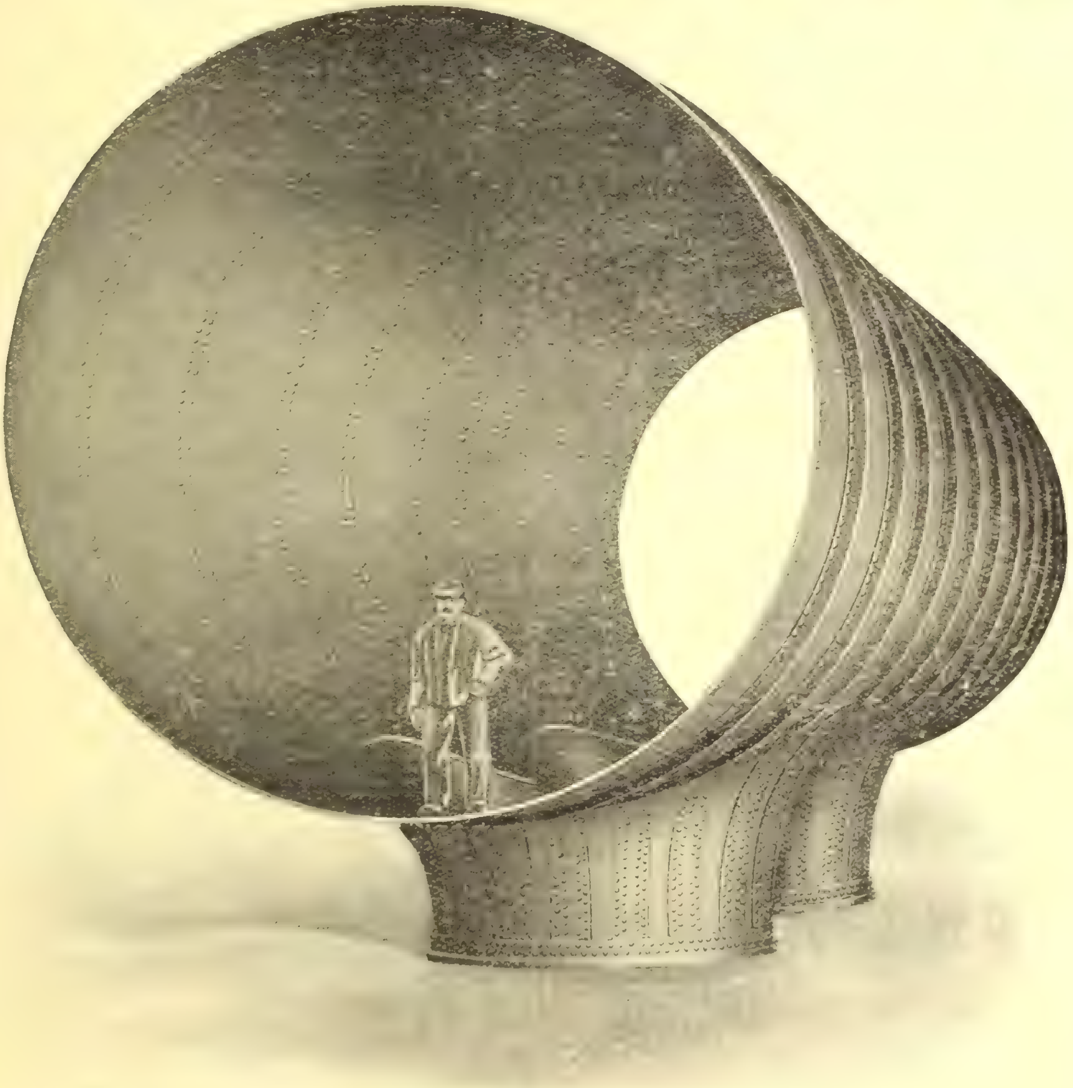
Charles Vezina, plumber, Quebec, is reported to have assigned.

Matte & Ruelland, painters, Quebec, are reported to have dissolved.

H. A. Burgess & Co., contractors, Ottawa, are reported to have assigned.

W. E. James, plumber and steamfitter, is stated to have assigned to W. A. Sole.

PENSTOCKS



Side view of Penstock Distributor built for the Ontario Power Co.

We would be glad to hear from those who have Heavy Plate work of any kind to build and especially American Companies who are contemplating the erection of Penstocks or Heavy Plate work of any description in Canada. We are specially equipped for this work.

Write us for particulars

The John Inglis Company Limited
Engineers and Boilermakers
14 Strachan Ave. TORONTO, Canada

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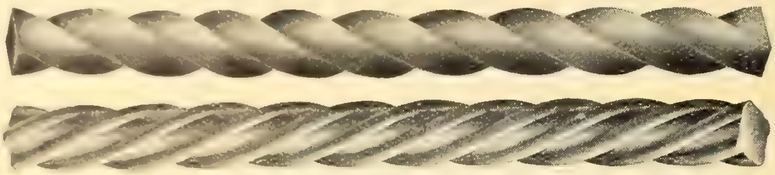
Plain, Round, Square, Flat, Twisted and Spiral Bars. Channels for Fireproofing

Squares and
Rounds
3-8 in. to
1 1-4 in.

Elastic Limit
50,000 lbs.
or Higher



HIGH ELASTIC TWISTED BARS FOR REINFORCING CONCRETE

Immediate
Shipment
from
Stock

Cut to
Required
Lengths

BUFFALO STEEL CO., Tonawanda, N.Y. "Suburbs of Buffalo, N.Y."

Toronto Office
117 Home Life Building

Producers of the Celebrated

"Peerless"
Bedford Stone

Bedford Indiana Limestone

Mill Blocks
Sawed Planed and Turned Stone

W. McMILLAN & SON

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CHICAGO, ILL.

Quarries and Mills { **Bedford, Ind.**
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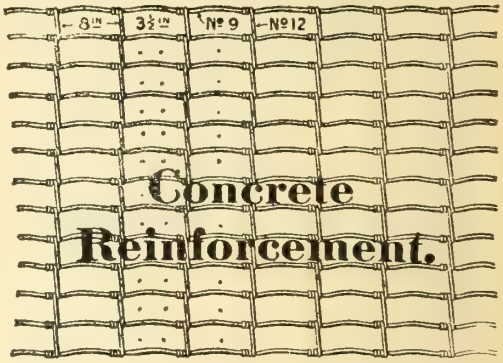
Concrete Reinforcement

In 3½ ft. Rolled Units

Page Concrete Reinforcement with a 3½ x 8 mesh, and running wires of 2,200 lb. tensile strength is used on the Harbour Commission Elevator, Montreal, Soulanges Canal, etc. It replaced on the Chambly Dam reconstruction on the Richelieu, a reinforcing that failed, although of large reputaton. This is proof of its quality. It really reinforces concrete work under heavy stresses.



Put up in rolls for easy transportation. Running wires of high carbon steel, not bent or kinked, and of full strength. For adaptable and safe reinforcing of concrete, in dam, retaining wall, and bridge work, factory and foundation work, etc.

PARTICULARS, QUOTATIONS AND SAMPLE ON REQUEST.

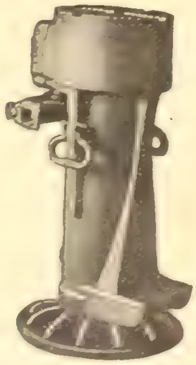
Page Wire Fence Company, Limited

Walkerville, Ont.

Toronto **Montreal** **St. John**

THE H. & E. PATENT BALL-BEARING LIFTING JACKS

For Railway and Bridge Work, Contractors' and Builders' Use



Made by practical Jack Builders. Material: best grades of malleable iron and steel. Fully guaranteed as to durability and efficiency. The long even stroke of the lever, together with the design and careful construction of the jack, makes it the quickess and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

To any responsible Firm or Railway in Canada any of these jacks will be sent on 30 days trial.

MANUFACTURED BY

H. & E. Lifting Jack Company

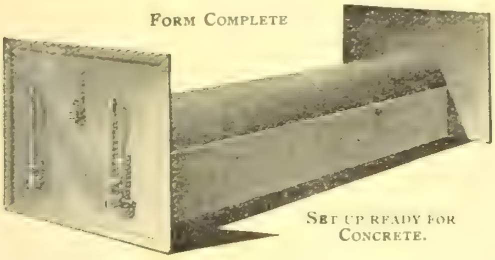
Waterville, Que.

Stock carried by F. H. Hopkins & Company, Montreal

COLLAPSIBLE STEEL FORMS

For the Building of

Culverts, Conduits, Small Bridges, Sewers, Etc.



Our Collapsible Steel Forms are the lightest, strongest and most durable made. They combine in the simplest way every requirement for rapid and practical work, and are attracting wide attention. They are highly endorsed by road and street officials, contractors and engineers everywhere.

WRITE FOR FORM CATALOGUE
ENGINE CATALOGUE FOR THE ASKING
COMMISSIONER'S TIME BOOK FREE

Concrete Form & Engine Co.
Successor to Collapsible Steel Form Co.
83 Congress St., W., Detroit, Mich.

"A work ill done must be twice done—only the best gives satisfaction."
—The Philosopher of Metal Town.

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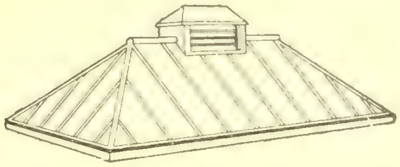
Are Practically Imperishable



The framework is of hollow metal, galvanized steel or sheet copper and when glazed with **wire glass** is **absolutely fireproof.** We make all shapes and sizes.

The exclusive features of "Metallic" Skylights make for permanency and absolute satisfaction. See that they are specified in contracts.

Information and prices on request.

Manufacturers 1953

The Metallic Roofing Co Limited
TORONTO & WINNIPEG

There is just one excuse for plaster ceilings:—

Only people not familiar with the multiple merits of Preston Steel Ceilings would permit a plaster ceiling to be placed in any house or store they are building. You, as a builder or contractor or architect, should see to it that your customers are made acquainted with the only modern, sanitary, fire-proof, damp-proof and PERMANENT ceiling. Let us prove its excellence to you, and you can then assert it to your customers.

Any property will rent or sell quicker when the ceilings are Preston Steel Ceilings. For these can be decorated beautifully as soon as installed—and the beauty endures. They need no repairs, for they will outlast the building itself. Yet their first cost—which is the FINAL cost—is remarkably little. Your profit is bigger, and the buyer of the property will be better satisfied. On rebuilding jobs, they can readily be used over old plaster.

Preston Steel Ceilings Cost Less Suit Best

Send for big illustrated pattern book, showing a few of the many styles we offer at lowest prices. Let us send you Price List.

Over 1,100 DESIGNS

Ask for the book

The Metal Shingle & Siding Co.
Limited
Preston, Ontario
Branch Office and Factory - MONTREAL

CORINTHIAN STONE

was used in this building as well as for two others for the same proprietor. Why!

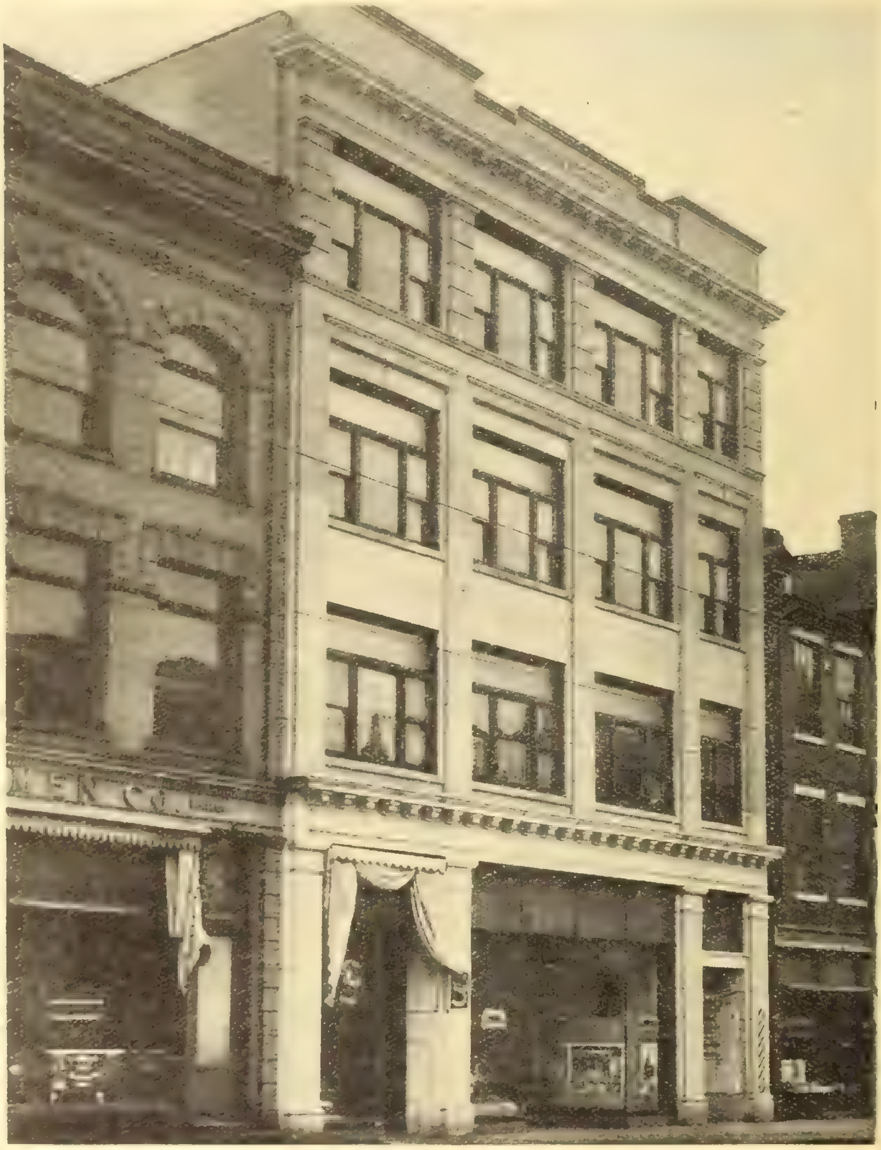
Because it was the Best

The same reason applies to others.

Any Size

Any Shape

Any Quantity



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Weber Chambers, King Street, Berlin—Architect, Chas. E. Cowan, Esq., Berlin

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All the Stone for above building supplied by

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OFFICE AND WORKS:
G. T. R. JUNCTION, GUELPH, ONTARIO

Armstrong CRANES

**Built for Every Service
up to 75 tons capacity**

Electric Traveling Cranes, Standard
Electric Traveling Cranes, Special
Electric Gantry Cranes
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Hand Operated Cranes
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H. J. ARMSTRONG
Engineer and Manufacturer
Markdale, Ont., Can.

An Expert Engineer Said:

"You have in Ohio the Canton Shales. These make the very best Paving Brick in the world. Engineers have come to Ohio from all over the world—England, Germany, Spain—to examine this material and are trying to find something as good in their countries."

(Excerpt from Address about Street Pavements by J. W. Howard, C. E. E. M., of New York, before the Associated Organizations at the Business Men's Club, Cincinnati, Ohio, U.S.A., published March 30th, 1910, in "The Enquirer".)

"Best Paving Block Made"

Daily Capacity 500,000

Every time **"Metropolitan Block"** are adopted it is the initial proceeding for a permanent pavement.

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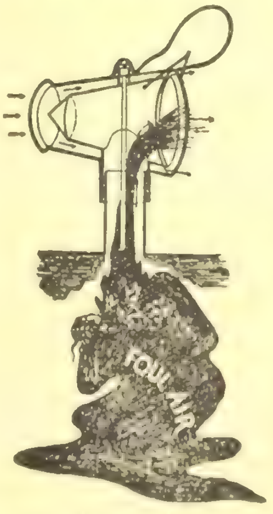
Interior and Exterior Marble, Slate, Floor and Wall Tiles, Mosaics, Plumbers and Electrical Marble, Granites for Building and Monumental Work.

AUTOFORCE VENTILATING SYSTEM

PURE AIR

Positively No Down Draft



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Write us for full Particulars

No fixed charges, power or repair bills. Requires no oil and is absolutely noiseless.

Unsurpassed for ventilation of Schools, Churches, Theatres, Offices, Work Rooms or for Chimneys with poor draft.

THE FORCE DRAFT is [illegible] laws [illegible] perfect ventilation and preventing the entrance of objectionable matter. [illegible] used to produce a draft, are not required.

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200 MORE BRICK A DAY

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Renfrew Lime

That is what the bricklayers who use it say, and they are the men who know.

With this fact before you why continue to use other lime that cannot be worked so easily?

Yes, your freight rate may be a little higher but i'ts worth it.

ALWAYS USE

"Renfrew" the Lime of Quality

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White Lime - Stone - Grey Lime

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FOR ALL PRESSURES
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ALMOST HALF A CENTURY

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Jas. P. Marsh & Co., 224 Washington St.
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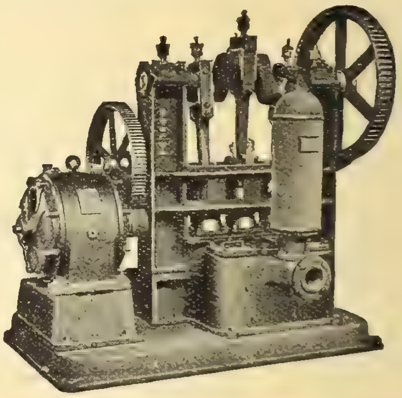
Established 1865

Goulds Efficient Power Pumps

Built in the best manner and of material that can be depended upon. They will be found to fully sustain the high reputation of

GOULDS QUALITY



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Works: Seneca Falls, N.Y.

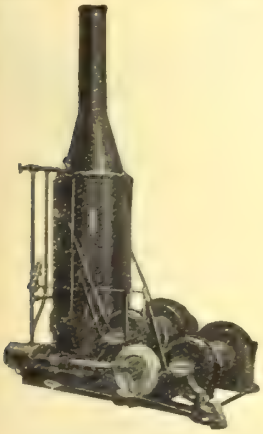
Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers

East Iron & Machine Company, Lima, O., U.S.A.



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Hoisting Engines, Horse Powers, Hand Winches, Derricks, Car Wheels, Axles and Boxes, Dump Cars, Rail Cars, Buckets

MARSH & HENTHORN, Limited

Makers of Hoisting Machinery, BELLEVILLE, ONT.

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MUSSENS
LIMITED
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Interior Trim, Doors, Stairwork

We are manufacturers of a fine line of Pine and Hardwood finish including interior trim, interior hardwood, pine and veneered doors and stair work.

If you are in the market for any of the above send us your plans and specifications and let us quote.

You'll find our Price is Right

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BRYAN
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You Cannot Afford

to use an inferior brand of plaster. A plaster that shrinks or falls off—the curse of modern building trades.
The standard of excellence is marketed in

"Hammer Brand" Hard Wall Plaster

HARD-WALL PLASTER
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It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

Albert Manufacturing Co.

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The Largest Cities and Smallest Towns use

W. E. Seagrave Fire Apparatus

MADE IN WALKERVILLE, ONTARIO

There is a Reason:
The name W. E. Seagrave guarantees the Best, the Lightest, the Strongest, the Most Economical in Operation and Maintenance. No order too large. No order too small. Consult us before buying.

Automobile Fire Apparatus and Motor Driven Vehicles of all kinds, our latest Production.

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A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

Note tremendous metal weight on this floor. Entire building of Alsen's Cement, reinforced concrete

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was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

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The Carey Roof Standard

CAREYS FLEXIBLE CEMENT ROOFING

TO PROVE TO YOU the high, standardized construction and composition of Carey's Roofing, we want to send you BOOKLET AND SAMPLE FREE, and give you practical information regarding Carey's Roofing based on 25 years' actual time-proved tests Carey's Roofing is equally adapted to flat or steep surfaces, wood sheathing, tile or concrete. Whether your contract is large or small, we want to show you the advantage of using a standardized roofing material.:THE PHILIP CAREY MFG. CO., 60 Wayne Ave. Cincinnati, O. 50 Branches.

FAMOUS FOR DURABILITY"

Interior Finish

in

Birch, Mahogany, Plain Oak,
Quartered Oak, Cypress, etc.
Sash, Doors, Porch Columns,
Store Fronts, Mouldings, etc.

S. Anglin & Company
Manufacturers of Fine Woodwork
Kingston, Ontario

"The best is cheapest"

"Sanorto"

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Guaranteed durable, jointless, noiseless; fire, water, insect and dust proof
For Churches, Hospitals, Hotels and all public buildings it is unequalled. Its use in private houses for bath rooms, kitchens, verandahs, etc. has always given the greatest satisfaction.
Our imitation marble is perfect. Testimonials on application Estimates on all classes of work free. Distance no object. Write for samples

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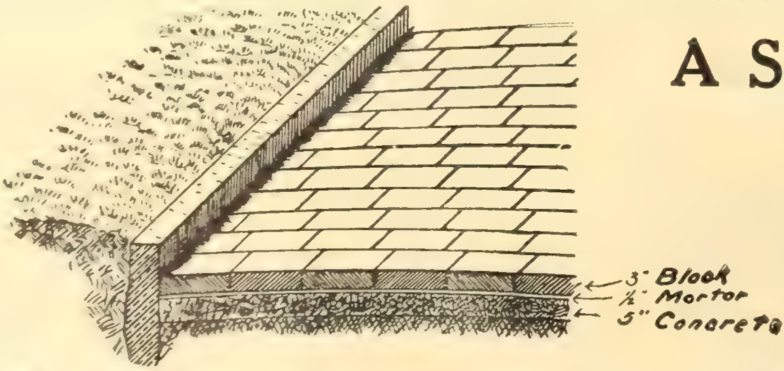

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Trade Mark Registered **Pronounce it RUE-BER-OID**

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The regular slate colored **RUBEROID**, in one, two and three ply, gives longer and better protection in proportion to its cost than any other roofing.

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The colored **RUBEROID**, in Red, Brown and Green, makes a roof which compares most favorably in appearance with tile or stained shingles, and has big advantages over these roofings in other respects.

It enables you to work out attractive color schemes for the better class of residences, churches, schools and other public buildings, without the serious fire risk of the shingle roof or the great strength of frame-work required to carry a tile roof.

We will be very glad to lay before you, either in person or by letter, full information about **RUBEROID** Roofing and its many advantages. May we have the opportunity.

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KAHN SYSTEM Reinforced Concrete

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FOR

Roofs
Floors, Partitions, Ceilings, Sidings

KAHN SYSTEM Reinforced Concrete

Eliminates centering in concrete roofs and floors.

Eliminates use of steel studs in partitions.

Eliminates small channels, tees and angles in ceilings.

Eliminates centering studs and special equipment in sidings.

It Effects a Saving Every Time

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Garbage, Street Cleaning Carts and Municipal Devices

The Most Complete and Perfect Line Made in ihe United States

THE TIFFIN WAGON CO.
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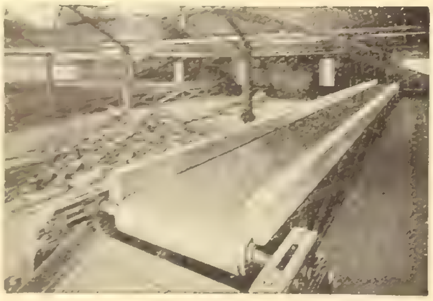

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FOR EXTERIOR AND INTERIOR DECORATING AND CONSTRUCTION

Used in all modern buildings where the maximum amount of light and sanitary conditions are essential

Summary of Classified List of Jobs

No.	JOBS	1st. Quality	2nd Quality
104	Public Office Bldgs. Banks, Libraries, Halls and Theatres	3,540,991	412,545
50	Private Residences	1,023,050	70,300
38	United States Government	613,639	119,115
17	Cemeteries, Vaults, Tombs and Greenhouses	43,049	5,500
111	Athletic Clubs, Clubs, Universities, College and School Buildings	872,822	1,274,580
58	Hotels, Apartments, Restaurants and Supply Stores (Markets and Refrig'g Plants)	1,547,162	251,797
70	Pumping Stations and Power Houses	1,779,271	935,622
25	Natatorium Swimming Pools and Comfort Stations	281,682	59,923
41	Hospitals, Asylums, Homes	1,062,571	110,400
37	Private Stables	460,320	124,242
32	Railroad Stations and Subways	838,501	192,192
56	Mills and Factories	609,549	1,075,713
17	Police Stations and Fire Houses	208,664	28,837
656	Total 1st	12,800,281	4,660,766
	Total 2nd	4,660,766	
	Total 1st and 2nd	17,461,047	
61	Bake Oven Jobs	101,694	
717		17,562,741	

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The Muddiest,

Impurest water can be made pure and available for feed or drinking purposes by filtering the "American" way.

Will remove iron, neutralize acidity, eliminate taste, odors, organic matter and discolorations.

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STONE of any Size and in any Quantity on hand for Sidewalks, Roadwork or Concrete Work

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Inspection and Tests of Steel, Iron and Cement
Resident Inspectors through Canada

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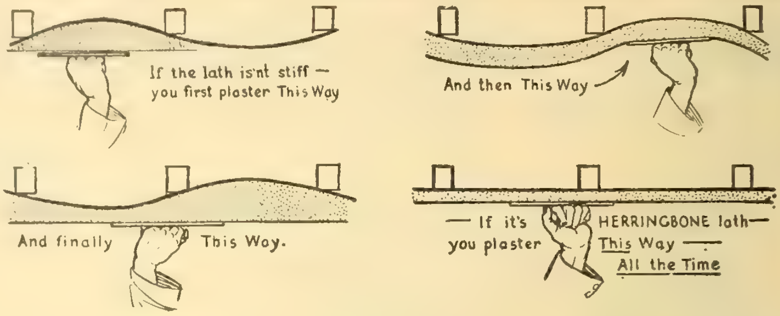
Another Reason for Herringbone Popularity:

Because Herringbone Requires The Least Plaster

STUDY THIS PICTURE ☛

Herringbone—the ribbed lath—is the stiffest made. A [illegible] who had contracted to plaster Herringbone lath, was recently compelled to work on another brand. He sued for damages, submitting cost accounts as evidence. He won.

May your [illegible] account sue YOU for damages?


If the lath is'nt stiff — you first plaster This Way
And then This Way
And finally This Way.
— If it's HERRINGBONE lath— you plaster This Way — All the Time

CLARENCE W. NOBLE, - 117 Home Life Building, Toronto, Ont.
GENERAL SALES AGENT
THE METAL SHINGLE & SIDING CO., MANUFACTURERS

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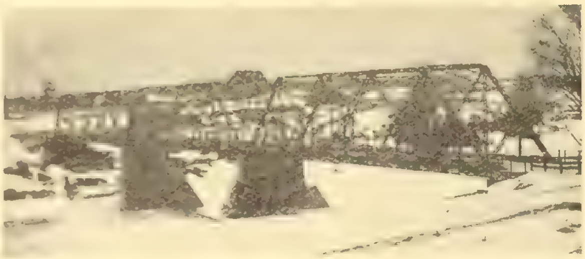

For over a quarter of a century we have been building Steel Highway Bridges throughout Canada.

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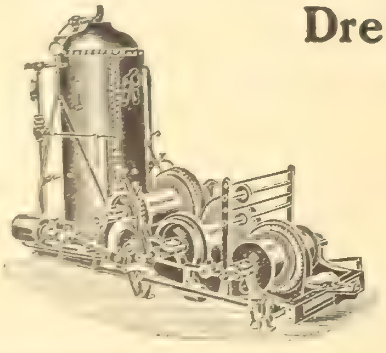

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Used by the Largest Mining Companies and Hydro-Electric Plants.
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Sizes 3 to 42″ Diameter up to ¼″ in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

Write for our Catalogue S-A and prices on your requirement

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NEW YORK OFFICE 50 Church Street

55,000 cu. yds. of Concrete

placed in the foundation of the Municipal Building, New York City.

Doud's "Acme" Center Dump Bucket

used on this construction.

This bucket gave complete satisfaction.

(Extract from letter referring to above.)
"Your bucket in every way has given perfect satisfaction; it is all that the word 'Acme' implies; in my eighteen years experience I have used no better."
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Supt. Construction
The Foundation Co

Load deposited perfectly central. Dumps into wagons, hoppers and forms with the same exactness

They always give satisfaction

Patented April [illegible]

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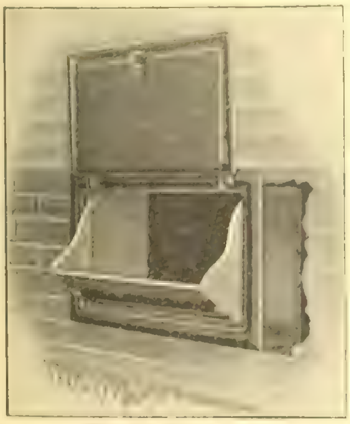
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with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

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Dundas Stone

All sizes for Concrete, Road Work, and Sidewalks

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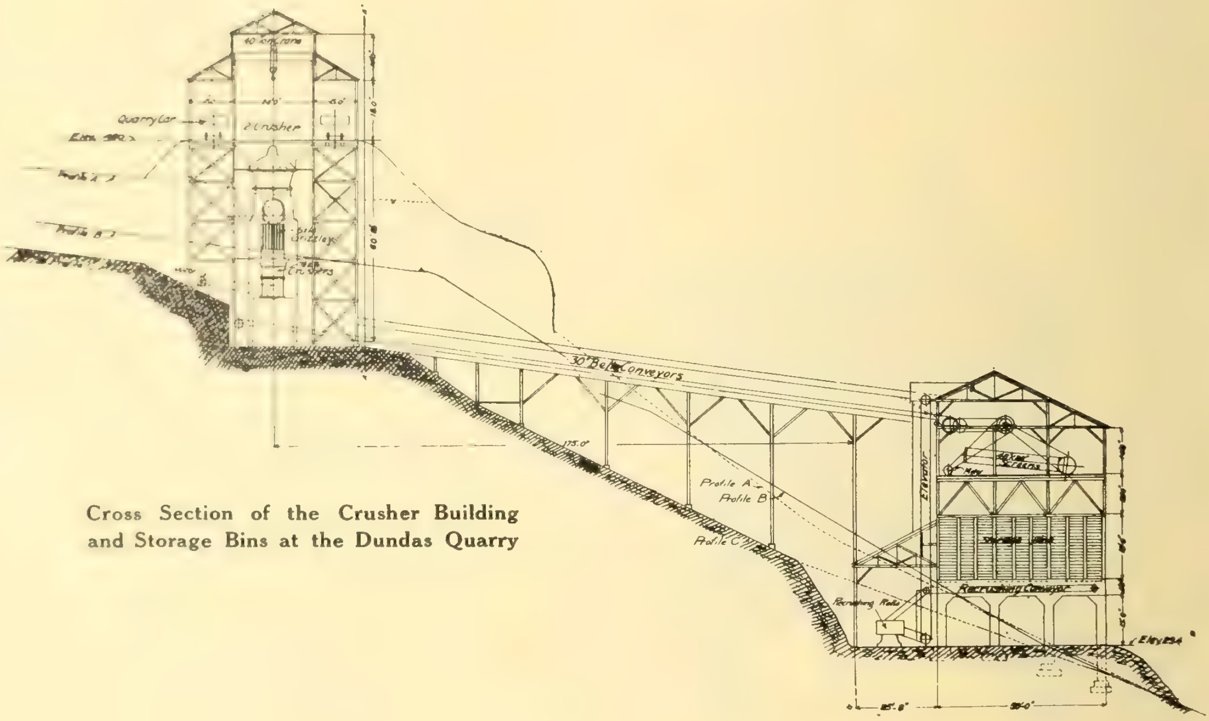

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With a bin capacity of 3000 tons we can insure all our customers prompt delivery.

Write or wire for quotations.

Doolittle & Wilcox, Limited

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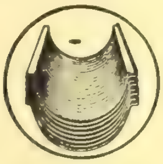
saves farmers money lowers taxes—betters roads

GET your township reeve or warden to study Pedlar Culverts. Send for the Free Book and show him why this Culvert surpasses for all ditch drainage, for restraining small streams, for every use that any culvert can serve. You will profit through lowered taxes, better roads and abolished washouts. Send for the book and interest your township's officials. You will benefit by what they will learn.

THESE culverts of mine are a great thing for the farming world. They not only make good roads possible, but they serve the farmer in many other ways. And they are so simply laid. They come nested like this:



This compactness saves freight and makes it easy to handle them. You put the sections together like this:

Then you clamp the flanges together like this:

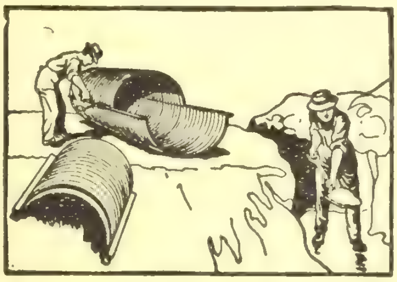
And you've got a piping that will outlast anything of the kind there is. Better get the book and sample and study it.

G. H. Pedlar

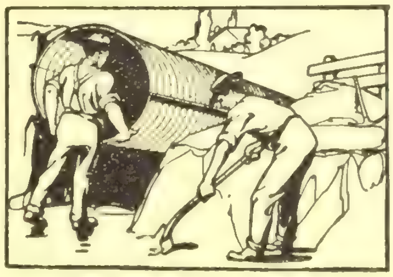
For a very moderate cost you can instal a perfect sewage-disposal system on your farm, using a suitably-sized Pedlar Culvert. You can realize the full value of the liquid manure your animals produce by draining your stable floors with Pedlar Culvert—and that highly valuable manure is usually wasted on farms. Pedlar Culvert makes it easy to water your cattle in winter. And there are a score of other uses for it on the farm.

Nothing vies with Pedlar Culvert as a well-curbing or a cistern lining. The thick galvanizing absolutely protects the metal of these Culverts from rust or corrosion, and the metal itself protects the water supply from contamination. For draining swampy spots around the farm, or for irrigation ditches and under-drains Pedlar Culverts far excel tile or cement piping, are much less costly, much easier to instal and infinitely more durable.

Pedlar Culvert is made in every standard size from 8 to 72 inches diameter, of Special Billet Iron of the the best quality, in extra heavy gauge. This Billet Iron is curved into semi-cylinders —curved while cold, so the sizes never vary a fraction. These half-cylinders are then corrugated by a pressure of sixty tons to the square inch. After being corrugated, the whole surface and each edge is heavily galvanized and made positively rust-proof.



A few hours' work—no special skill needed—and an indestructible culvert is in place ready for use.



PEDLAR CULVERT

is made in Nestable Sections from the Best Billet Iron, heavily galvanized and deeply corrugated.

It is the simplest kind of work to put these half-sections of Pedlar Culvert together permanently. One half-cylinder is placed on another, and the flange-rib on each side is rigidly compressed flat by the huge pressure exerted by a simple but effective tool. No bolts, no rivets, no makeshifts—but a triple-thick locking rib-flange that gives Pedlar Culvert immense strength. Thus it will stand crushing strains that would destroy any other piping.

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WE WANT AGENTS IN SOME LOCALITIES
WRITE FOR DETAILS
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And Sample Culvert

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(Largest Sheet Metal Manufactory in the British Empire)

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include in the output of their immense factory the below-mentioned specialties in sheet metal building material. Samples, descriptions and prices of any of these will be readily forwarded postpaid and free upon request addressed to the Pedlar warehouse nearest to the inquirer.

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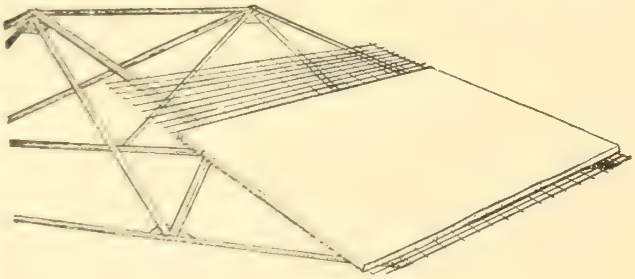

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Can be made in any Length or Width to suit you.

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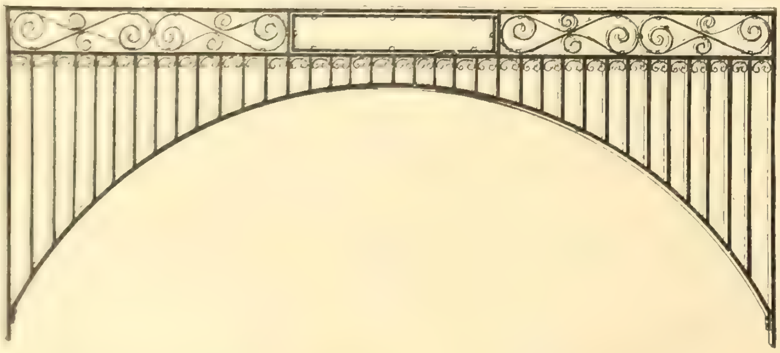

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The kind that don't sag and warp

We have equipped our factory with the latest door making Machinery and are able to turn out doors not only of the best quality but at the right price.

Prompt Deliveries **Write for prices**

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Cast Iron Fittings and Valves are Right

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SIMPLE AS A. B. C.

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CRUSHED STONE

All Sizes

¶ For Roadways and Sidewalks also specially adapted for

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¶ Our arrangement with C. P. R. to have our stone brought to Toronto DAILY by SPECIAL TRAIN makes our DELIVERIES promptest possible.

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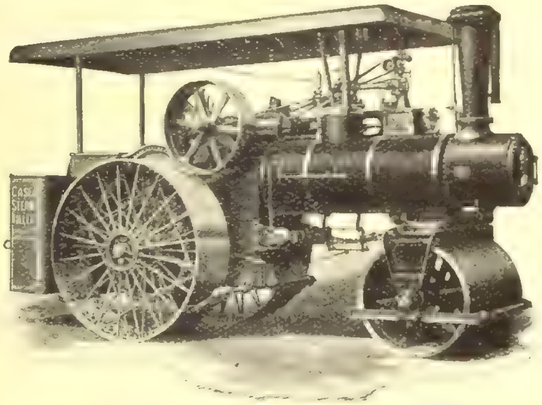

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Time price, with Simple Cylinder, $2,200; with Compound Cylinder, $2,300
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Six per cent. discount for Cash.

Send for Road Roller Catalog 27 which gives full description.

Case Rollers have greater fuel and water capacity than others

We sell the well known line of Troy Dump Wagons and Dump Boxes

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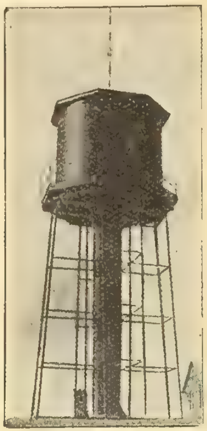

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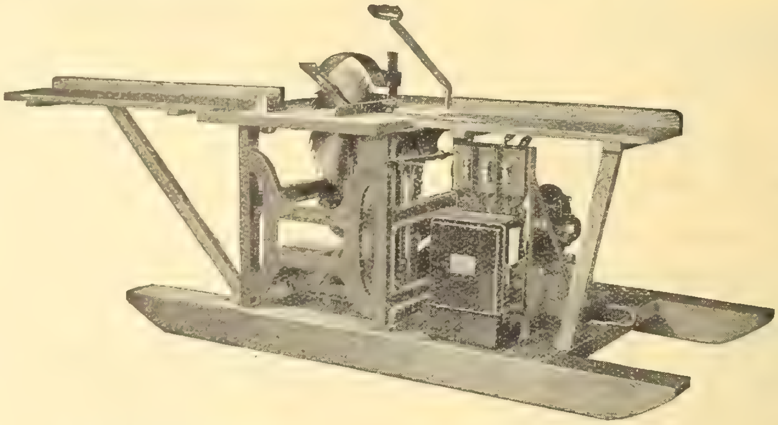

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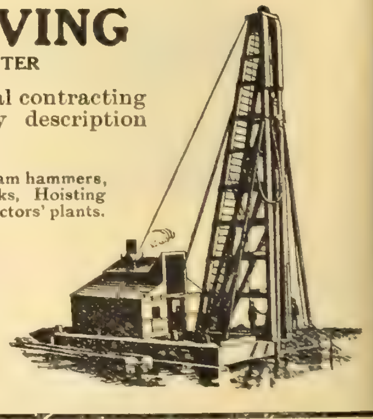

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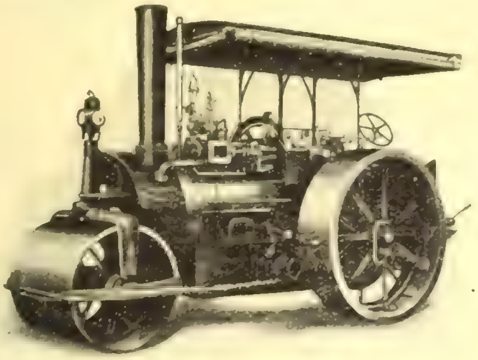

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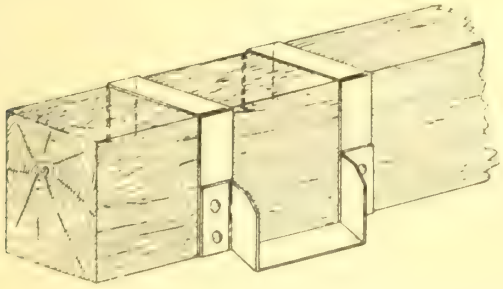

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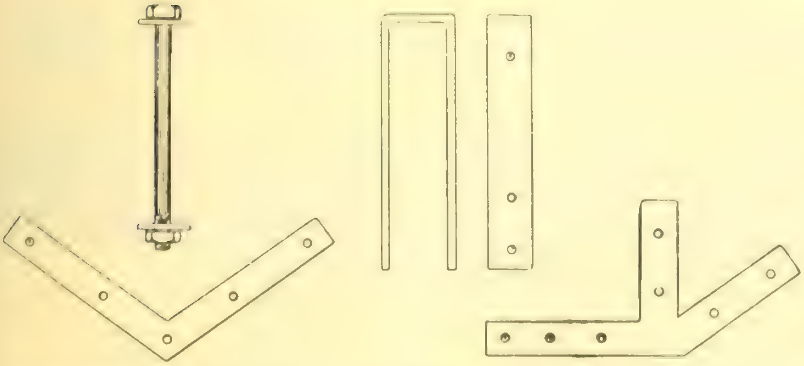

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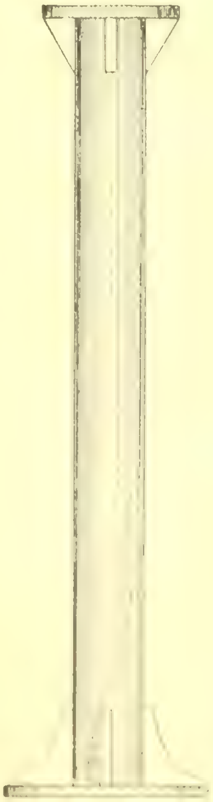

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40 u. i.	4.25	3.50	6.75	5.50
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60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
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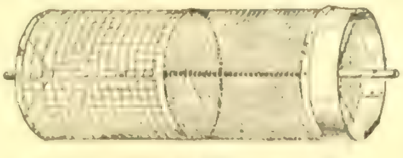

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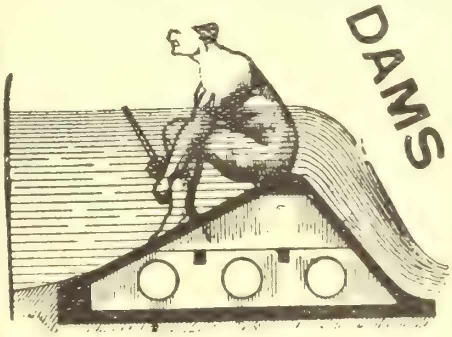

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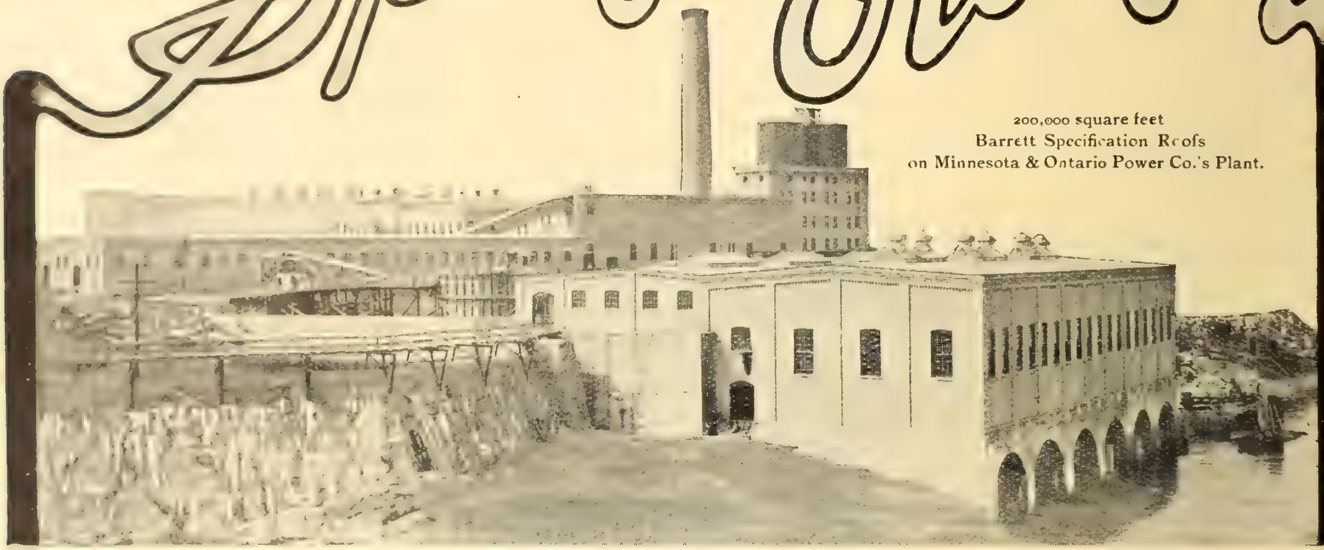

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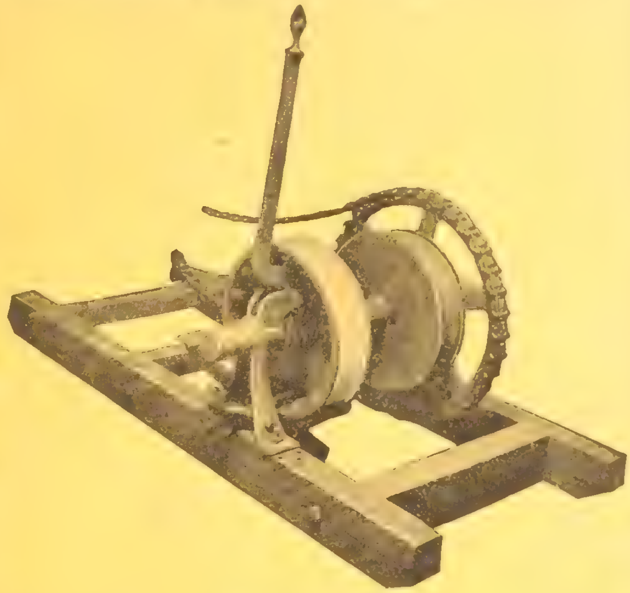

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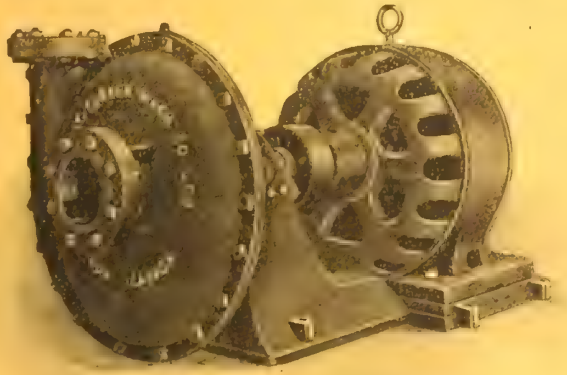

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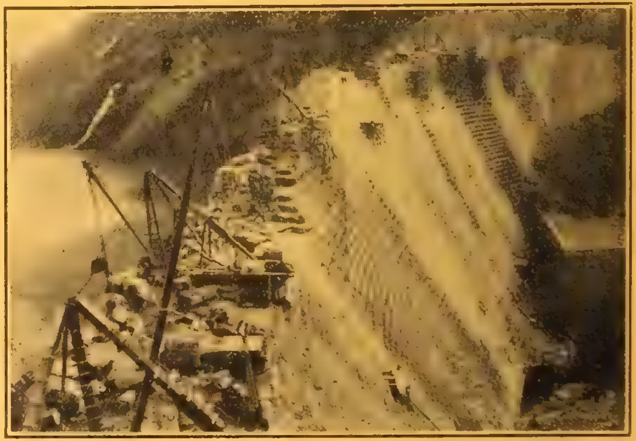

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that we have an Information Department consisting of trained and practical men, whose time is employed solely in answering enquiries from people interested in cement.

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that out of the mass of enquiries that come to us, there are a number that include questions as to what might be termed Allied Industries. These we now answer to the best of our ability, but we could answer them still more satisfactorily, if manufacturers of materials used in conjunction with cement would co-operate to the extent of sending copies of their catalogues and other literature to be placed on file in our office for reference.

We should like to obtain

the names and addresses, together with catalogues, and any other obtainable information of manufacturers of and dealers in:

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It is not alone for our own convenience that we make this suggestion; firms who manufacture or deal in such articles will find it to their own advantage to have this information in the hands of our Information Department, thereby enabling us to hand on to them from time to time enquiries for such materials as they severally make.

In sending catalogues, literature or information, please address same to "Sales Department."

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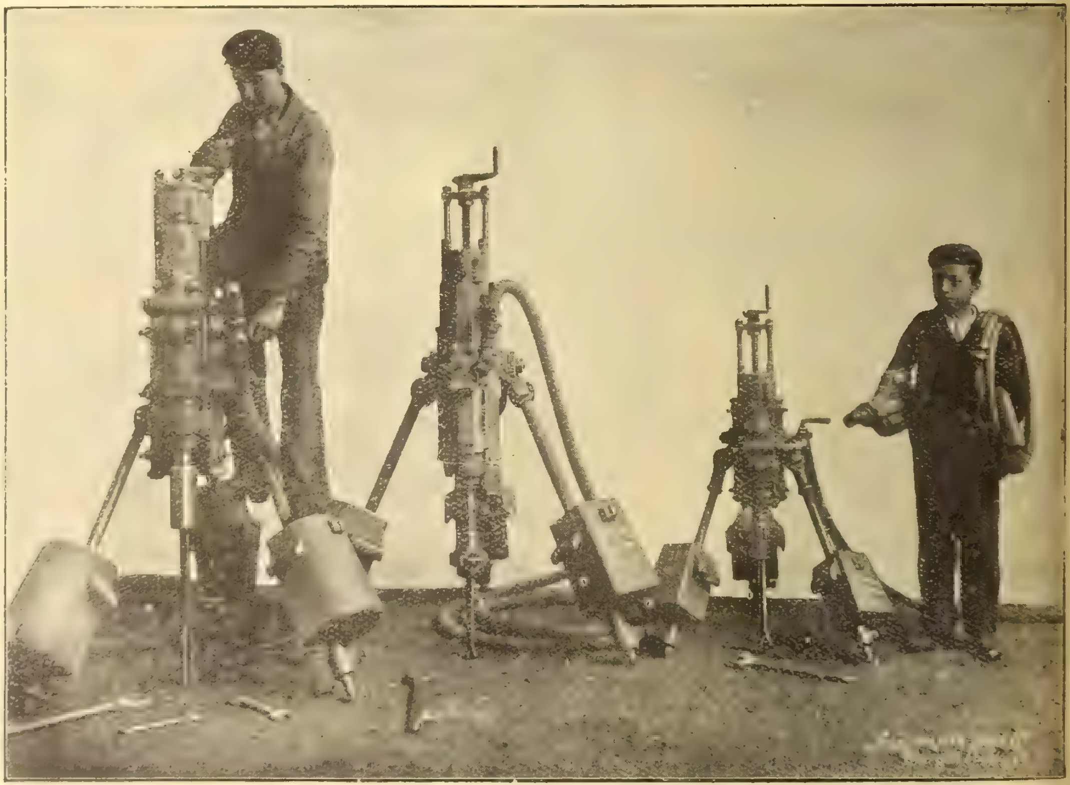

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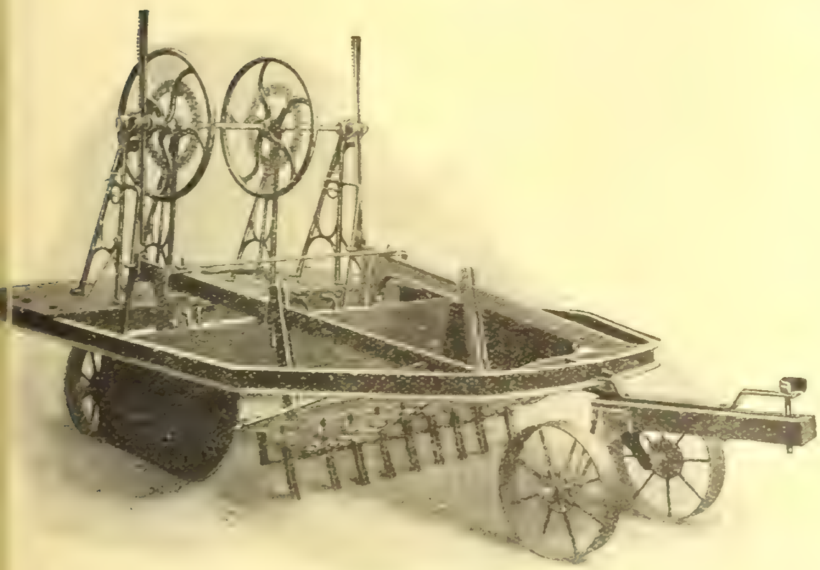

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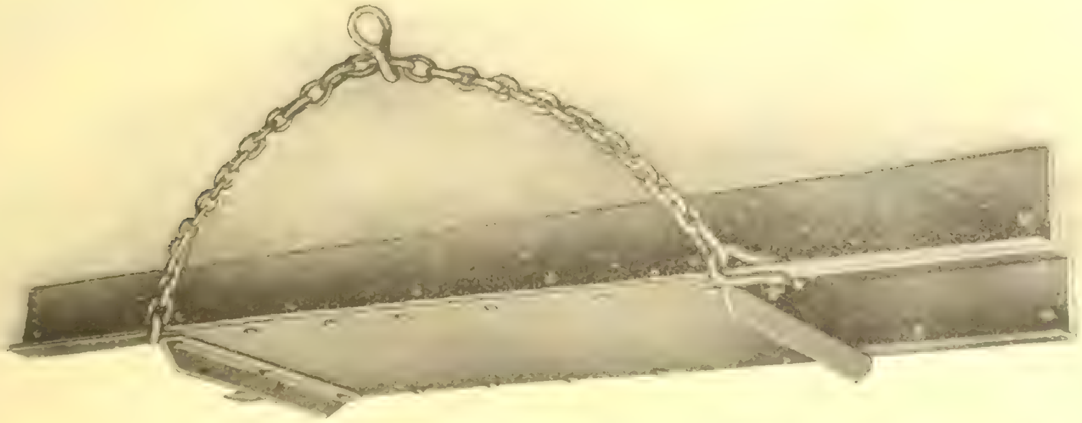

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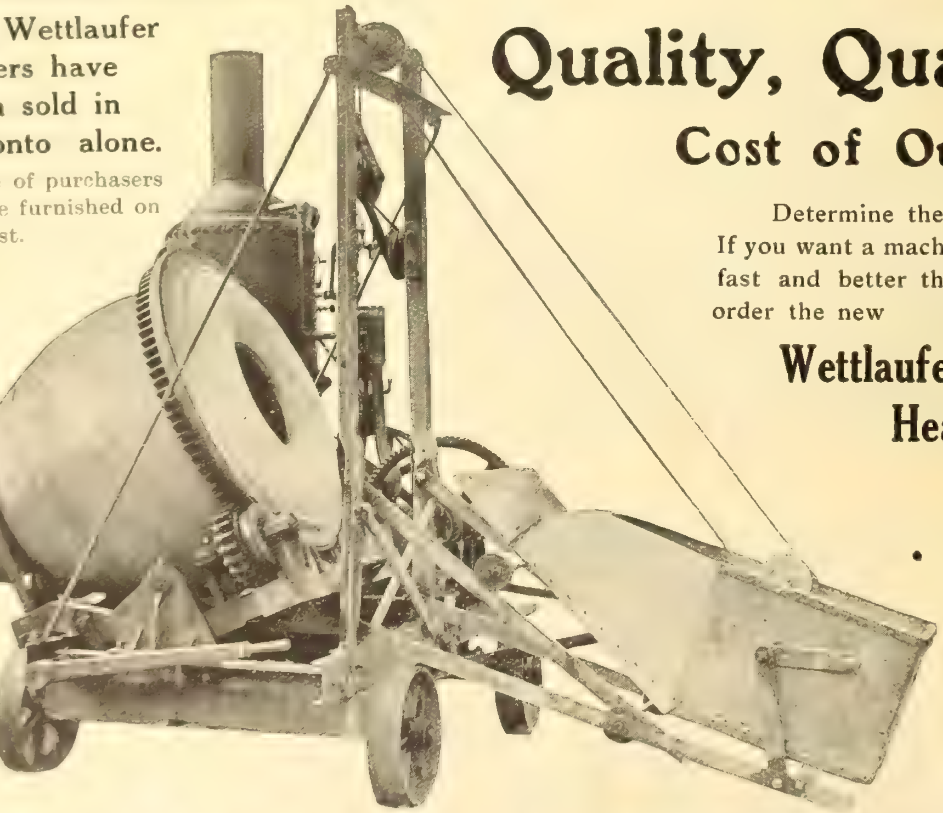

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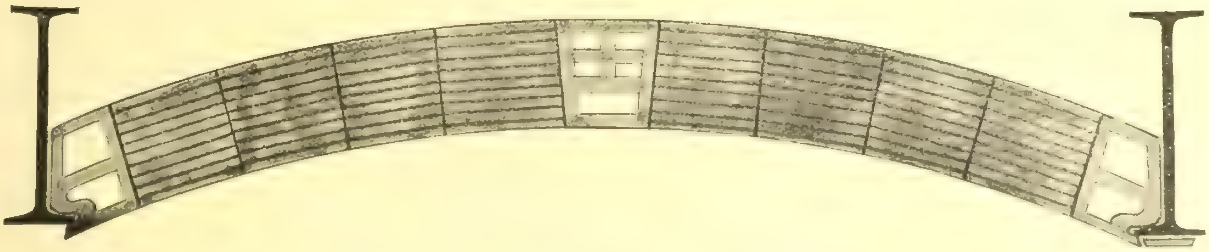

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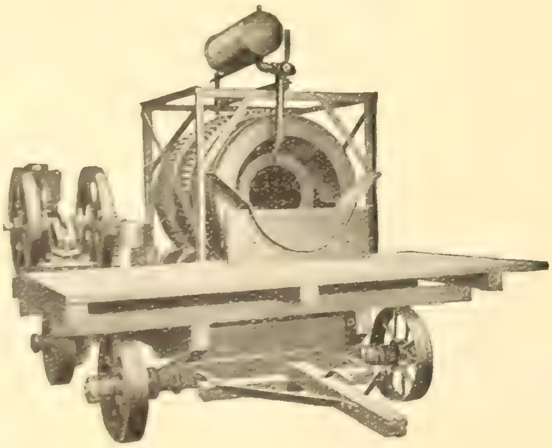

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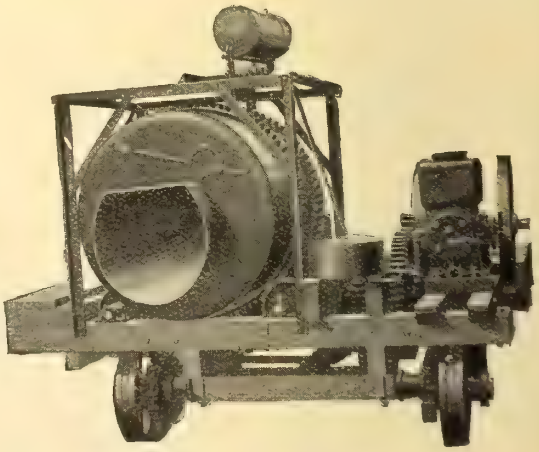

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The only mixer having batch constantly in sight of operator.

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We carry machines in stock at Kansas City and St. Joseph, and can make immediate deliveries

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SEAMLESS STEEL TRACTION AND LIGHTING POLES.

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FOR GAS & WATER MAINS
IN LENGTHS UP TO 40 FEET.
AN IMPROVEMENT ON CAST IRON.
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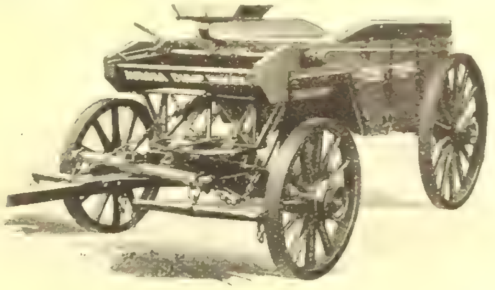
That's the saving effected by constructing the bed of selected Washington Fir, and its just one of the many reasons why lightest weight is combined with greatest strength in the



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Built low for easy loading, coupled short for lightest draft only 7 feet 4 inch wheel base.
Chains entirely outside of bed, direct pull of chain on doors and length of chains adjustable.
Slotted hinges on doors give vertical movement, preventing installing team on dump.
Study its sturdy construction—its mechanical, labor-saving and dependable qualities. Catalog for the asking.

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The Toughest Stone for
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Invites Correspondence Regarding

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Cast Iron Specials, Valves, Hydrants etc.

Men who have used old-style derricks and know just where they fall down will tell you that

John T. Hepburn

Scotch Derricks

will do **more** work, in **less** time and with **less** laborers than any other derricks they have handled. Our Derricks are

Made out-right in Our Own Shops

All castings are cast in our own foundry. Forgings are forged by our own blacksmiths. From first to last each operation is watched over with the greatest care—and the reason why you can get so much out of Hepburn Derricks is because we put so much into them—so much honest workmanship—so much of genuine quality in all materials. A better derrick at a better price you'll not find anywhere.

Made in standard sizes from ¾ ton upwards.
Write to-day for prices and full particulars.

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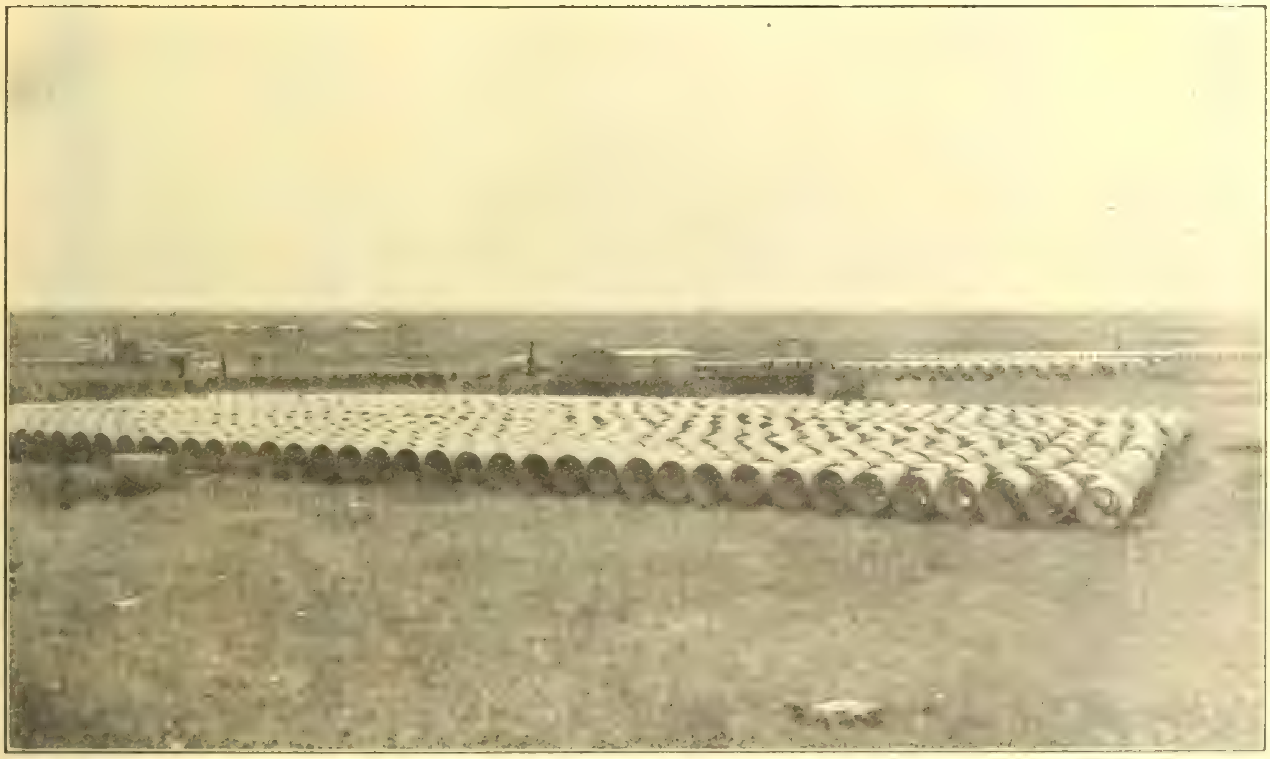
Meriwether System

Continuous Re-inforced

Concrete Pipe

Patented



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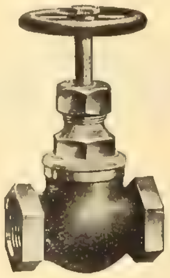

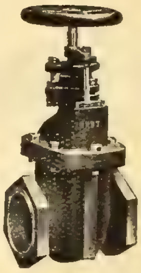

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KERR VALVES

For City Waterworks

We manufacture valves and hydrants for every branch of city and town waterworks. If you are in charge of any waterworks' extensions, be sure you find out about "Kerr" goods before you prepare your specifications; then specify "Kerr."

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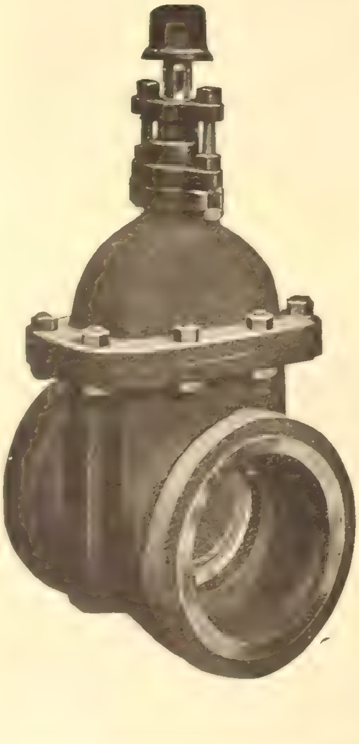

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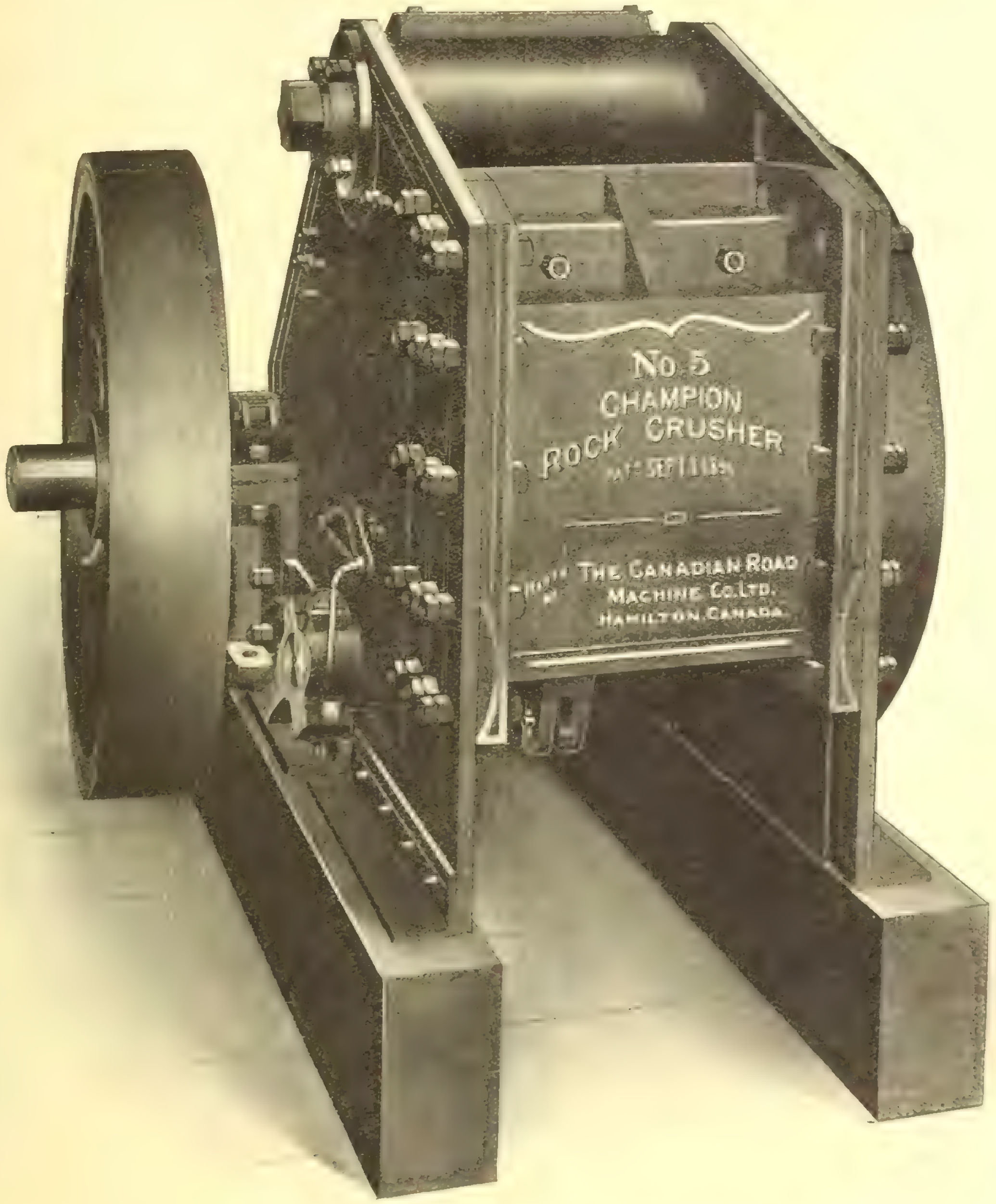

"CHAMPION"

"Standard for 20 years"

"CHAMPION" Rock Crushers are for men who appreciate that reliability and efficiency are the first two vital considerations in the selection of machinery. The famous feature, the "elliptical cam," giving the **"Champion"** two motions of the jaws instead of one, has made this the most widely used crusher in Canada.

Send for full description

American Road Machine Company of Canada, Limited, Goderich, Ont.

Address correspondence to

The Hamilton Machinery Company, Ltd.

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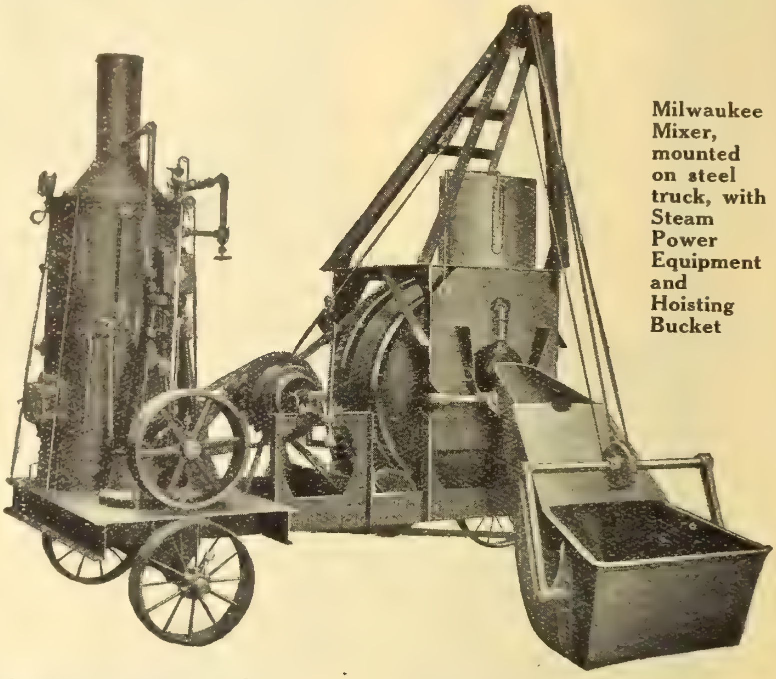
Sole Agents for the above Company.

Also Canadian distributors for the famous Inter-State Automobiles.

Milwaukee Concrete Mixer

Rosebery's Unequaled Proposition and one that is booking the orders. Write for 1911 Catalogue. Just out.



Milwaukee Mixer, mounted on steel truck, with Steam Power Equipment and Hoisting Bucket

OUR PROPOSITION

WE will put a Milwaukee Mixer on your work for a period of five days. You are at liberty to test it thoroughly in every kind of work. If, at the expiration of this time, you are not fully convinced that it is all we claim and superior to any concrete mixer in the market, return it to us and we will pay the freight both ways.

No firm ever made, or can make, a more straightforward offer than this, as it will not cost you a cent if we fail to convince you of the superiority of THE MILWAUKEE CONCRETE MIXER.

Milwaukee Concrete Mixer and Machinery Co. - **Milwaukee, Wis., U. S. A.**

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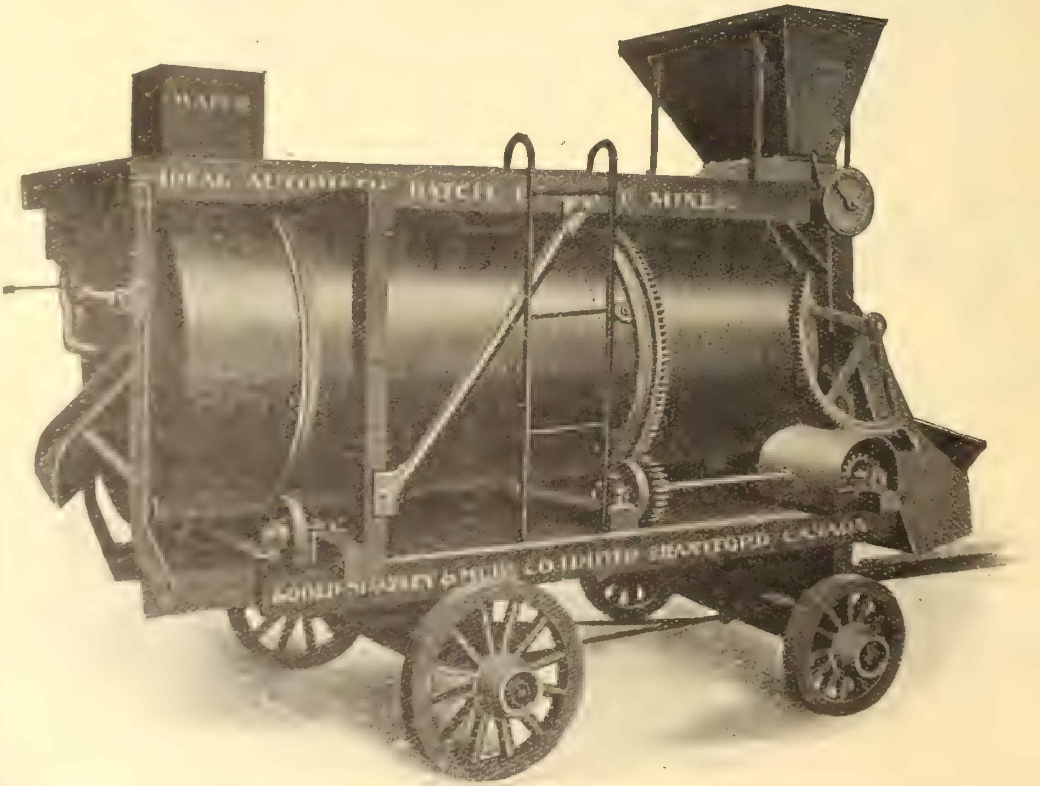
CONCRETE MIXERS



Our 1911 machine has all steel frame, Heavy Steel Gears; is the most up-to-date mixer made. It is a money maker.

We make

Tanks and Towers

for all purposes and any sizes. Gas and Gasoline Engines, etc.

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The
GOOLD SHAPLEY & MUIR CO. LTD.
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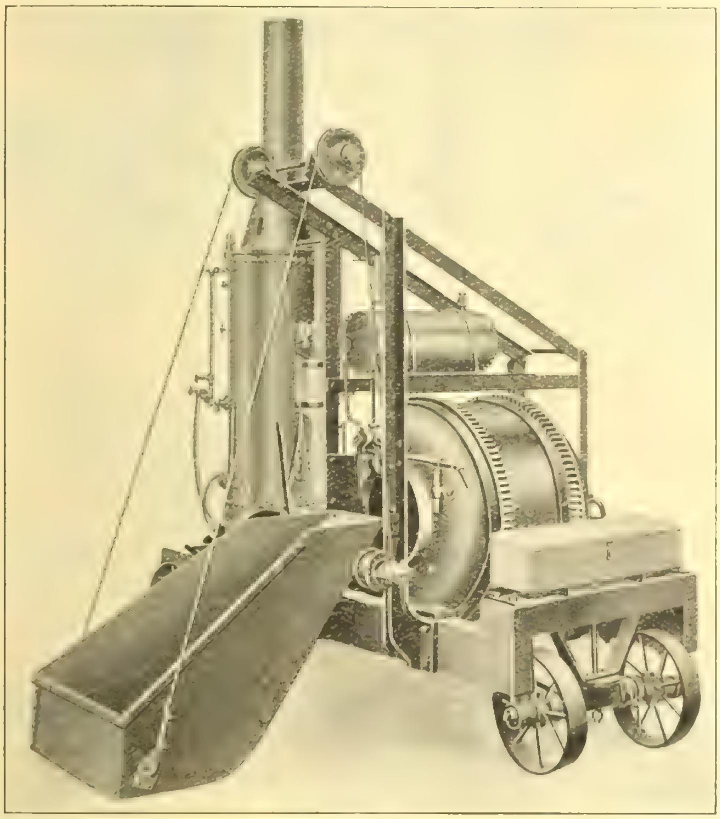
Better Concrete for Less Money



Concrete Mixer theories grow into definite mixing knowledge when every mixing action is a known positive mechanical force.

There's an individuality about Koehring Mixing—it's known mixing.

The drum is a plain cylinder with heavy cast iron heads, but bear in mind, it's made without deflecting faces or other obstructions, to limit the end-to-end mixing.

The mixing blades are so arranged that they not only lift and pour the aggregates from the side but carry them alternately from end-to-end and break them over against the heavy heads.

There's no guess work about it—no rolling over in the centre of the drum, every action of the aggregates is performed by a known positive mechanical force.

But there's another mixing than this in the Koehring Mixer.

When not in discharge position, the inner end of the discharge chute is tilted downward.

Material carried up by the mixing scoop at the side is discharged onto the inwardly and downwardly extending chute and decends from the inner end in a continuous flow, the entire width of the chute, and falls to the bottom at right angles to that from the mixing scoops and the end-to-end mixing.

That's three independent mixings, everyone of them a known mixing and no theories required to explain them.

Three known mixings in one, is why the Koehring Mixer is the fastest in existence.

But known mixing is not its only improvement over old style batch mixers.

The trunnion rollers are cast with wide flat faces, chilled to extreme hardness, and placed wide apart at the extreme ends of the drum. This not only guarantees a stable equilibrium to the drum, but insures its maintaining perfect alignment even after years of service. The outer end of the discharge chute does not tilt backwards, affording ample clearance for wheelbarrows, even in the smallest sizes. There are other worth considering features that every mechanical mind knows are correct in principle, explained in our new catalague.

Do not fail to write for it at once.

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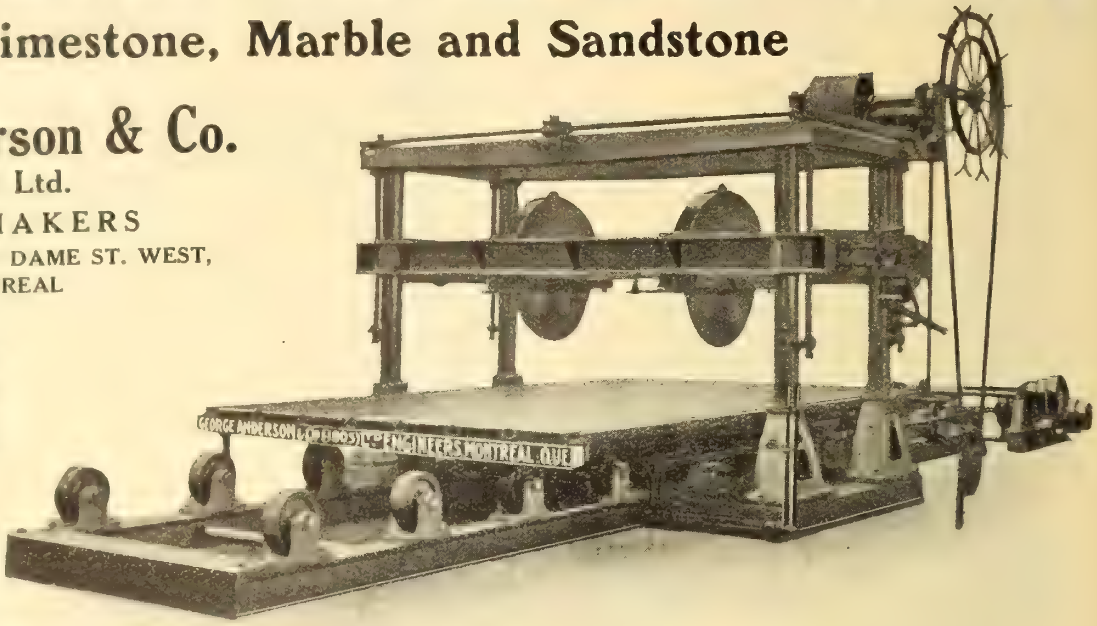
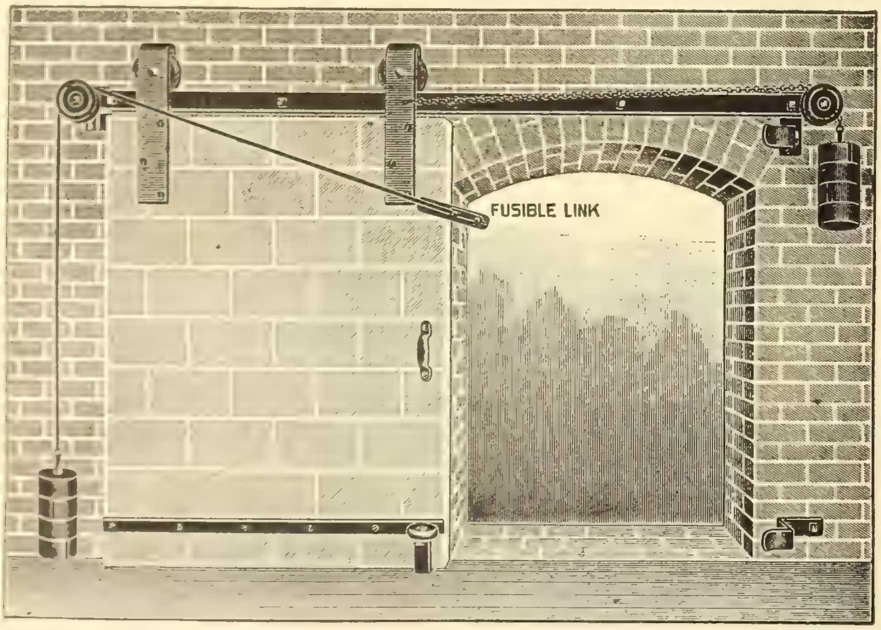


Anderson's Rising and Falling Diamond Saw, made under British and U.S.A. Patents 209179, 657262 **SINGLE AND DOUBLE TABLES**

About 50 of the above Machines at work in Canada



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We are specialists in this particular line and can solve your most difficult problems.

Estimates furnished on complete work or any part.

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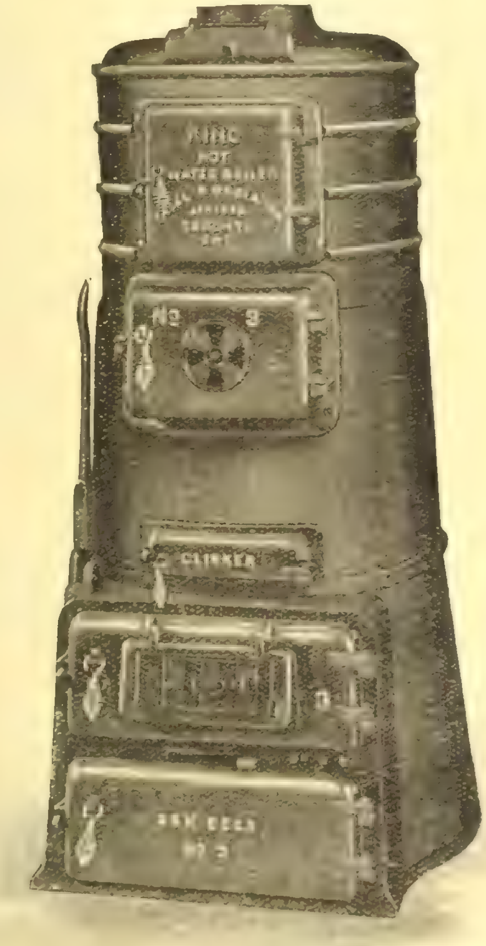
STEEL AND RADIATION LIMITED



"King" High Base Boiler

"KING" BOILERS and "KING" RADIATORS

In placing the "KING" HOT WATER BOILER on the market, we do so with a knowledge that we have at last produced a boiler that combines the best materials, design, workmanship and finish with a PERFECT COMBUSTION and Internal Circulation, giving it greater heating power than any other boiler.

"KING" BOILERS are equipped with a special shaking apparatus that is a revelation to those who are only familiar with other grates.

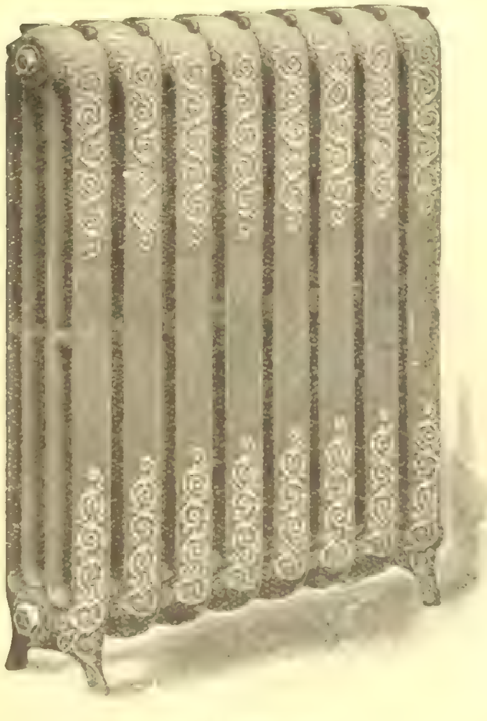
See them at our Show Rooms.

"King" Radiators

No Radiator on the market is more favorably known than the "KING" RADIATOR, and none so satisfactory to those who have used them. Why? Because we subject each radiator to the most rigid inspection possible and use every means in our power to detect and preclude the possibility of leakage, so that it is practically impossible for a "KING" RADIATOR to leave our hands unless perfect.

"KING" RADIATORS are made in artistic styles of both plain and ornamental patterns. A feature of "KING" RADIATORS is the uniformity in the design of ornamentation, permitting the use in a room of various heights and types.

On view at our Show Rooms.



4 Column

¶ Insist on having "KING" Boilers and "KING" Radiators specified.

¶ We invite your inspection at our show rooms.

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Stocks and
Agencies in All
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Most advertisers claim everything in sight for their product, and usually a little more for good measure.

We admit that we are not the only concern that can supply **Sewer Pipe.**

If we should go out of business to-day you could still get **Sewer Pipe.**

BUT

We do furnish high-class Sewer Pipe!
We do sell at reasonable prices!
We do aim to give every customer a square deal!
We do know that our delivery has won us a good name!

AND

If you are going to buy **Sewer Pipe** we are very positive it will pay you to send your orders to the pioneers of the Sewer Pipe Industry.

WE ARE IN BUSINESS TO STAY.

The Hamilton & Toronto Sewer Pipe Co.
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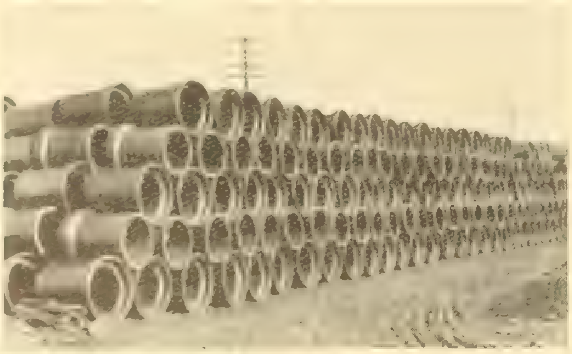
HAMILTON and TORONTO

We are not the Largest Manufacturers

The Row of Fame is a Row of VITRIFIED PIPE



18 inch Double Strength

We Have Many Rows Like This In MIMICO

Sizes 4 in. to 24 in. in any desired quantity

OF

SEWER PIPE

IN THE WORLD

and we have not been at it for Fifty Years either.

Look at our Pipe

and then tell us if it is necessary for us to make those boasts before we modestly admit that we hold first mortgage on the title of BEST.

ARE YOU FROM MISSOURI ?

Then we can produce to your satisfaction if you give us the opportunity.

MIMICO PIPE

may be equalled, we admit, but it's more than a day's journey to find a better.

The ONTARIO SEWER PIPE COMPANY, Limited
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Sewer and Culvert **Pipes**

We manufacture Highly Glazed and perfectly Vitrified "Standard" and "Double Strength" Sewer Pipes and make a specialty of Double Strength Pipes for Railway Culverts.

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Fire Clay Goods, Stove and Range Bricks, Boiler Tube Bricks, Locomotive Blocks, and all kinds of "Special Shapes."

The
Standard Drain Pipe Co.
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Factories at
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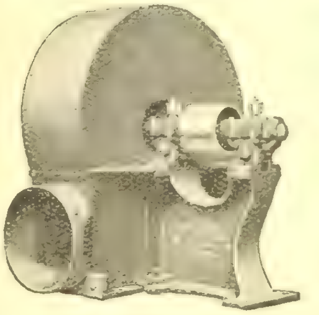
Sturtevant Stock Fans

Sturtevant



Stock Fans embrace such a wide range of types and sizes that nearly every commercial fan requirement can be met by a fan now in stock ready for immediate shipment.

When impossible to meet requirements with a stock fan our equipment, consisting of the largest plant in the world devoted to fan building, enables us to make prompt shipment of a built-to-order fan.

The oldest and largest engineering organization in the fan industry is always at the call of our customers, to make recommendations and suggestions. Spare parts for all our Stock Fans are kept ready for immediate shipment.

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Offices within calling distance of all large centers

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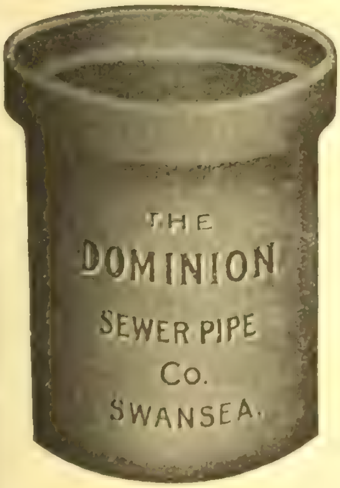
Salt Glazed and Vitrified
SEWER PIPES



True to Size.
Impervious to Water.

Sizes manufactured and always in stock 4 in. to 24 in.

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We can serve you best. Our prices are right. The quality of our goods is of the highest excellence We are the largest manufacturers of **Vitrified Salt Glazed Sanitary Sewer Pipe** in the world. Sizes, 3 in., 4 in., 5 in., 6 in., 8 in., 9 in., 10 in., 12 in., 15 in., 18 in., 20 in., 22 in., 24 in., 27 in., 30 in., 33 in., 36 in., 42 in. Lengths, 2 to 3 ft. Socket, Standard or Deep and Wide. Thickness in sizes 15 in., to 42 in., both Standard and Double Strength; We also manufacture Flue Lining, Wall Coping, Vitrified Conduit, Vitrified Curb, Paving Blocks, Drain Tile, etc.

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Railway Engineers and Contractors

Timber culverts rot, clay pipe culverts break from frost or weight, metallic culverts rust and are woefully dear, CONCRETE CULVERTS LAST FOREVER and the price is relatively low.

The only absolutely **durable and frost-proof** culvert pipe is

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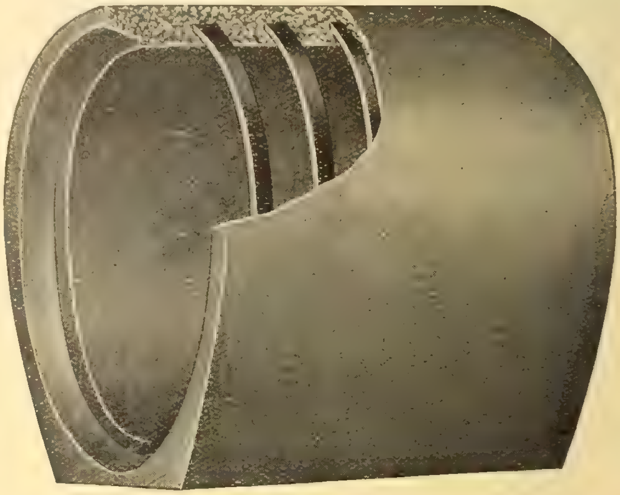

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of **first quality.** The prime requisites of first quality concrete are **good raw material, proper proportions** and **scientifically correct methods.**

We possess all these in the highest degree. Our years of experience, our facilities and our raw material enable us to make **good concrete** and make it **always good.**

Nowadays the railway engineer must get results in **permanency** as well as in other matters. The contractor too must get results if he is to stay in the game. A very important result to him is the **economy** of buying material that **holds out,** that can be handled with **facility,** and that can be procured **promptly** and at a **reasonable price.**

Don't imperil your interests by using non-durable material, or by trusting to the random hits and misses of a novice when you can buy **durable, mature,** and **guaranteed concrete pipe,** from a long-established and reputable firm.

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Quality Guaranteed

No Loss from Breakage

Low Prices

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for Reinforcing Concrete

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Cold Twisted Squares

Maxwell Deformed Bar

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LOW PRESSURE TURBINES

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Notable Crushing Plant

Each Opening 42 ins. x 8 ft. will receive a block 3 ft. x 5 ft. x 10 ft.

DESIGNED
AND ERECTED BY US

View No. 4

You now see why the No. 21 Crusher at Laurin and Leitch's, Montreal, shown last week has such an enormous capacity. Note the high arched spider, offering a free opening and preventing any bridging of the rock when dumped into the machine.

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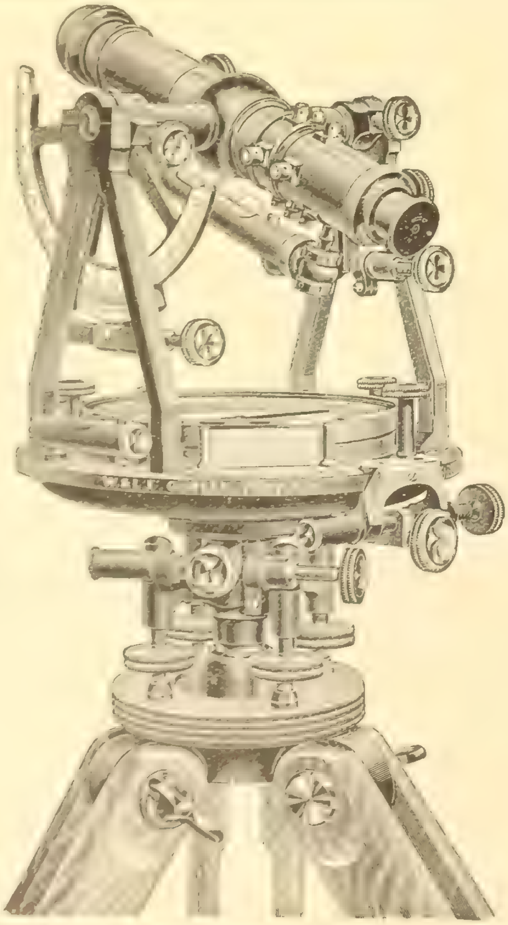

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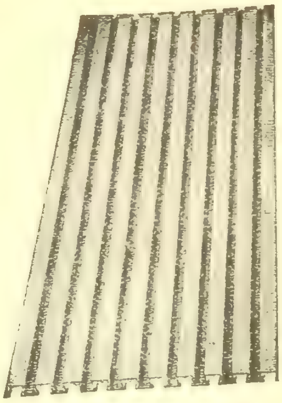
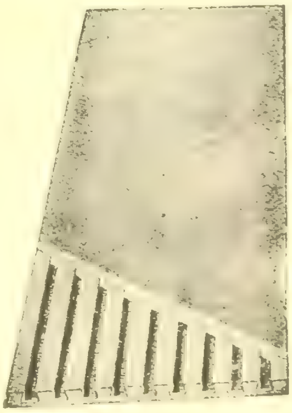


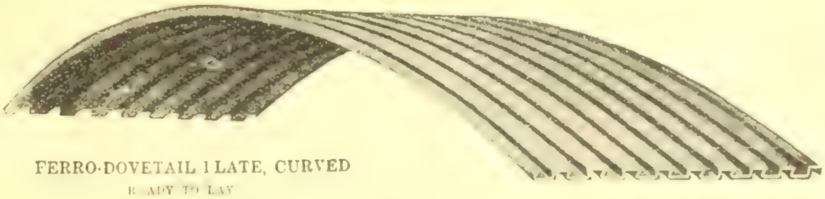
FERRO-DOVETAIL PLATE
READY TO LAY

PEDLAR FERRO-DOVETAIL PLATES meet the demand for an absolutely fireproof roofing or flooring material, wherein permanence of construction is the most vital consideration. Moreover, these plates admit of extremely rapid work. A study of the illustration herewith, will explain exactly what these plates are and how they are used. Made in both flat and curved sheets, these plates fit the steel between spans, interlock and are then at once ready for their bed of concrete on top and for plastering on the under side. When these two operations are completed the plates are completely imbedded and protected from deterioration from any cause whatsoever. Gases, acid fumes and other injurious influences have no effect on a Ferro-Dovetail roof. Moreover, they can be waterproofed with any good roof covering. Ferro-Dovetail Plates stand for economy, not only in the cost of time required to put them into position, but also in that they are fireproof and that insurance underwriters make rate concessions on buildings on which they are used.



FERRO-DOVETAIL PLATE
CONCRETED ON TOP, PLASTERED UNDERNEATH

For architects and builders who are not thoroughly familiar with all the details of this new idea in construction, we have prepared a special book on the subject which we will be glad to send FREE on request. This book deals with the specifications, uses and methods of erecting Pedlar Ferro-Dovetail Plates. Write for it—just ask for bulletin No. 52. Perhaps it would be well to send for it NOW.



FERRO-DOVETAIL PLATE, CURVED
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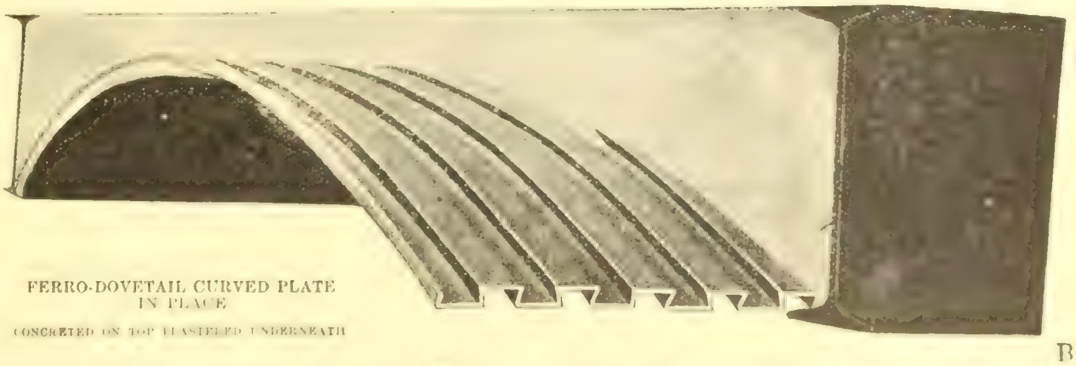

FERRO-DOVETAIL CURVED PLATE
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CONCRETED ON TOP PLASTERED UNDERNEATH

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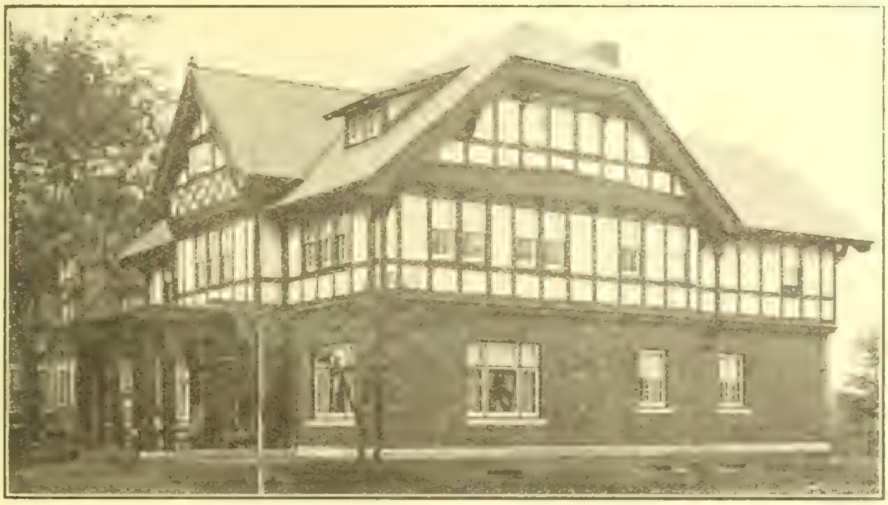

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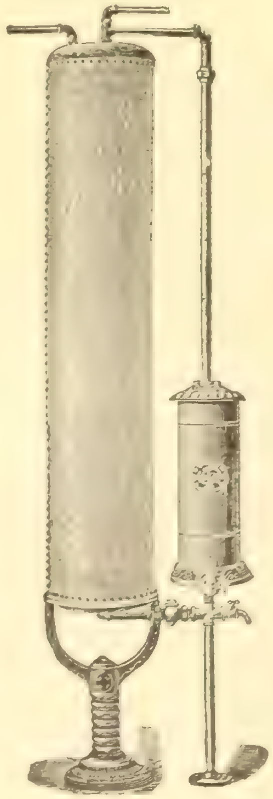
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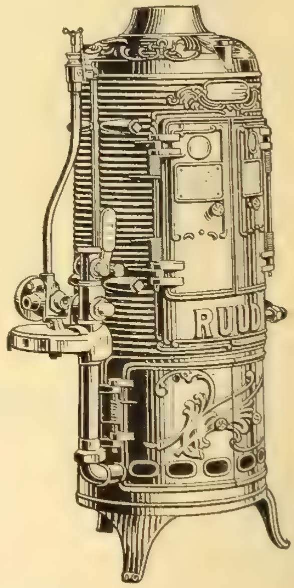

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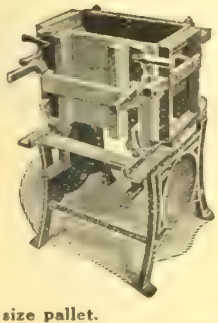

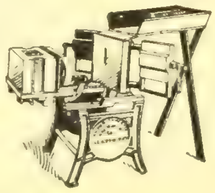

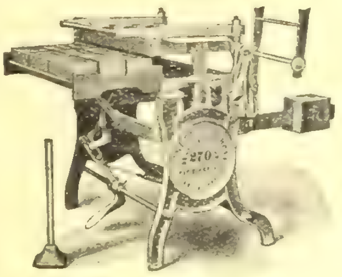

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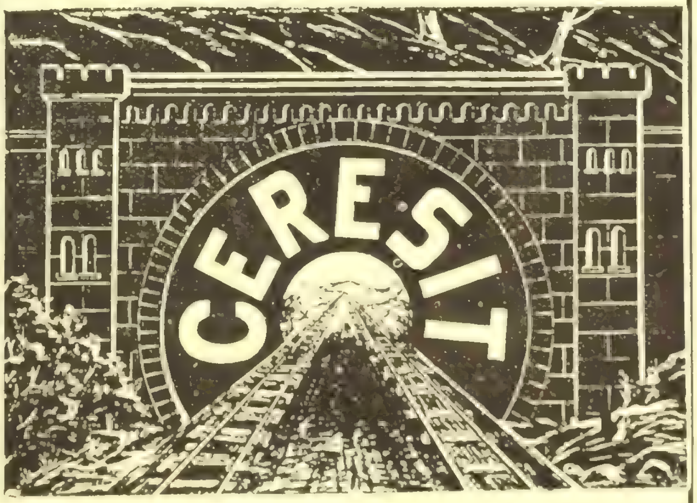

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Vol. 25 April 12, 1911 No. 15

The Qualifications of a Contractor

In the course of a speech at the annual dinner of the Contractors' Protective Association of New York, Capt. D. L. Hough, president of the United Engineering & Constructing Company, of New York, summed up in a few words the qualifications required of a contractor. He said:

"There is no class of work that takes as varying qualities or so many qualities as contracting. It appeals to men who are optimistic and to those who have born in them the longing for doing things. The contractor must be a man, first, of that most uncommon thing, common-sense; and he must have physical sense, the sense that tells a man without calculating where lies the centre of gravity; the sense that tells a man values without estimating; the sense that tells a man quantities without measuring. He must have magnetism in order to gather his men about him. He must have a reputation for justice in order to hold them. He must be forceful in order to inspire energy in others. He must be a lawyer and buyer. He must have the ingenuity of the inventor and the grasp of the field-marshal. He must be a diplomat, and he must be a politician. He must also know when not to be a politician. He must be a financier, and, I regret to say in these days, an advertiser, and he must be a prophet."

The Engineer as Sole Arbitrator

Arbitration methods are discussed in an interesting letter published in this issue under the signature of Mr. Archibald Currie, the new city engineer of Westmount. One Mr. Currie condemns the practice of making the engineer his own judge in case of dispute and names three alternative methods, of which, all things considered, and under the principle of choosing the least evil, we prefer, perhaps, the practice in vogue in Great Britain. None of such methods, however, can ever be entirely satisfactory and the solution is yet to be named. It may be that a satisfactory tribunal might be found in some association combining the dual interests—such an institution, for instance, as the American Society of Engineering Contractors—but we would like to have some further opinions from those who have actually suffered (or gained?) as a result of the inequalities of the present system.

Another Unjust Contract Clause

In our last number we published an interesting paper by Mr. Daniel J. Hauer, in which a number of clauses inimical to the interests of the contractor were discussed at some length. That the list of such clauses is not exhausted is evidenced from the following form of contract used on an important piece of railroad construction in Canada:

"All machinery and other plant, materials and things whatsoever provided by the contractor for the work hereby contracted for, and not rejected under the provision of the last preceding clause, shall from time to time of their being so provided, become, and until the final completion of the said work, shall be the property of the commissioners for the purpose of the said works, and the same shall on no account be taken away, or used or disposed of except for the purpose of the said works, without the consent in writing of the engineer, and the commissioners shall not be answerable for any loss or damage whatsoever which may happen to such machinery or other plant, materials or things, provided always that upon the completion of the works and upon payment by the contractor of all such moneys, if any, as shall be due from him to the commissioners, such of the said machinery and other plant, materials and things as shall not have been used and converted in the works and shall remain undisposed of, shall upon demand, be delivered up to the contractor."

This clause can mean much more than a first reading would seem to indicate, says our Chicago contemporary, the Contractor, in editorial comment of the above. It is not ambiguous, but it can be construed in several ways. Under most circumstances an injury would not be done to the contractor, but circumstances could arise, under which the well meaning contractor might find that he had signed away his rights to his property, and he might not have any redress.

To some extent the trouble, should trouble occur, is caused by covering two things in this paragraph, namely, materials and machinery or plant. Many contractors do not cover well enough, the item of furnishing different kinds of materials. This should be done, for on some jobs the materials cost many thousands of dollars, and at times become a large part of a contract. Thus, the contractor should have assistance in purchasing his materials, that is, if we assume that the contractor should only have a nominal capital, and the company is building the work on its own capital, which is already in hand. To assist the contractor in a matter of this kind, it is only necessary to have named in the contract a price for materials delivered on the line of the work, and a price for the material in place. The price for material delivered should have only a fair profit in it, for if it is excessive, fraud and trickery may enter into the furnishing of it.

A clause somewhat like this would then be an excellent thing, and would be a protection both to the contractor and the owner. Suppose a contractor had to furnish a million feet of timber, and he had made a contract for his needs with several mills. Then suddenly the price of timber went up, and the contractor already had several hundred thousand feet delivered. It might be quite a temptation to the contractor to sell a lot of this timber at a handsome profit, to the detriment of his work. Under this clause the engineer could prevent the contractor disposing of this material. On the other hand, the contractor should be protected in his purchases. He should be furnished with bills of material promptly, and he should order his materials from these bills. Then he should be paid promptly for all materials delivered, and, if, at the end of the job, there is any material left over, the contractor should be paid for it, whether the owner wishes the material or not, as it was ordered by the engineer's instructions, and the contractor should not be responsible.

One thing objectionable in this clause regarding materials is due to the fact that although it states the materials become the property of the commissioners as soon as they are delivered, yet the risk and responsibility of the care of them is to rest upon the contractor. This should, in the writer's opinion, be changed to read that the materials will be paid for "as delivered," and should be held at the risk of the contractor until paid for "in place."

The great injustice that can be done under this clause is in regard to outfit and machinery. It is evident, or should be, that plant and material cannot be furnished for a contract on the same basis, yet under this clause this is provided for, and here is where the contractor may be seriously injured.

Under ordinary circumstances there would not be any trouble, but if the contractor perfected his contract for any reason, or should the organizer become provoked at the contractor, and wish to injure him, then the contractor would not be able to remove any of his plant or machinery to another job until the commissioners or their engineer gave permission in writing. Thus the contractor's outfit could be confiscated for the life of the contract he had undertaken, even after the breach of contract had occurred, even if the breach was caused by the owner. This the contractor may not only lose his contract, but also his outfit, temporarily, by means of which he makes his living. The clause does not openly provide for this, but it can be so construed, and a careful reading will show it. Clauses giving the owner the right to take over the contractor's outfit, in case of a forfeiture or breach, were once very common, but it was found that it was almost equal to a total confiscation, as after the contractor gave it his plant, it was generally so misused, that it would be almost worthless when the contractor again came into possession. Suits brought to recover the damages to the plant were generally won by the contractors, with the result that such clauses have in most cases been dropped from contracts.

Now we have one that confuses plant with materials to be furnished, and it is evident that a revision is necessary.

Sewage Purification Plants as Nuisances

In a paper before the Institute of Chemical Engineers, Mr. George C. Whipple, in a paragraph headed "Purification Plants as Nuisances," called attention to certain precautions which should be taken in designing and locating sewage purification plants. The paragraph was as follows:

"Purification works themselves may be a source of nuisance. There is a natural opprobrium attached to a region where such works exist that results in a recognized deterioration of property values. The processes used for the purification of sewage not infrequently result in odors that may be distributed over considerable areas. Where the purification works are entirely covered, as some kinds of works may be, little or no nuisance may result, but where, for example, the sewage is first submitted to putrefaction in a septic tank and the septic effluent then sprayed into open air upon the surface of sprinkling filters this exposure of the atomized liquid results in the liberation of odors that may reach distances of half a mile from the plant, depending upon the amount and character of sewage treated, the locol topography, prevailing direction of the wind, humidity in the atmosphere and other conditions.

"Frequently high winds will carry the spray itself for several hundred feet with inevitable bacterial pollution of the air. In the operation of sprinkling filters also it has been found that at certain seasons of the year swarms of flies breed in the porous beds. These are very troublesome in the immediate vicinity of such works. In considering the need of sewage purification it is proper to balance these nuisances against those resulting from the discharge of unpurified sewage into a body of water. It not infrequently happens that the installation of sewage purification works merely substitutes one nuisance for another."

A cause of nuisance, possibly even more common than those mentioned, is the failure to use sufficient care in operating the plant, either to prevent nuisance or to secure the highest efficiency, says the Municipal Engineer, commenting upon Mr. Whipple's remarks. It is altogether too common for cities, having once constructed a plant, to expect it to operate automatically, with no attention whatever, or to place in charge some one with no great amount of intelligence and no experience whatever in purification plants, and thereafter pay no attention to the results obtained by him. In some cases State Boards of Health are empowered to require the construction of sewage purification plants, but have no control over their operation; and a city upon which the construction of such a plant has been forced by the State Board, finding that it has no further authority in the matter, absolutely neglects the plant. A plant so neglected is almost certain not only to fail to make any adequate return for the money invested in it, but may result in actual nuisance. In either a water or a sewage purification plant care in operation is fully as important as in designing or construction.

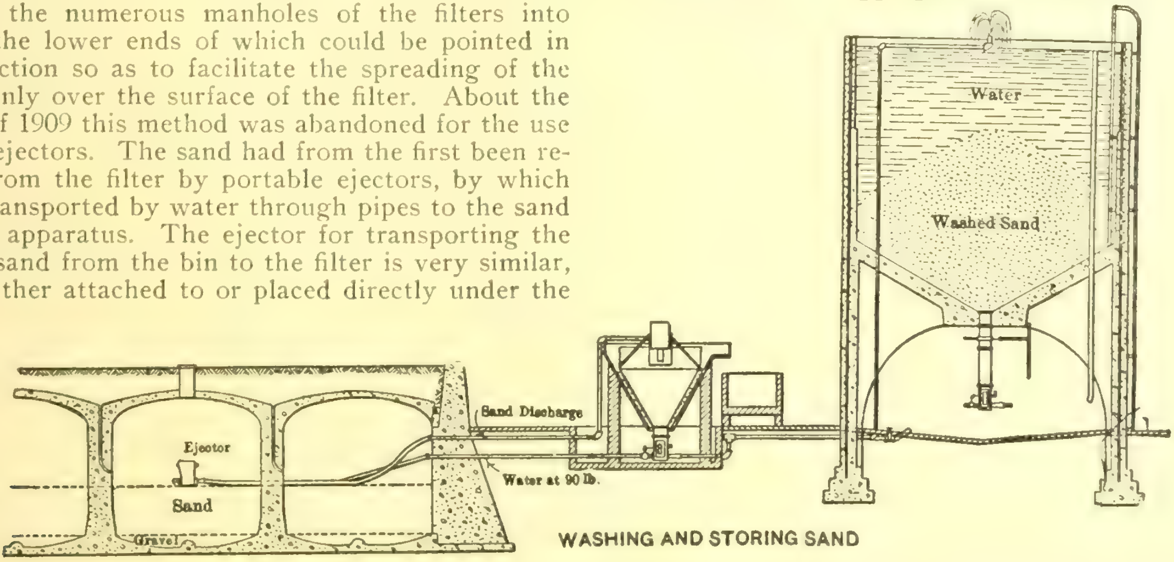
The Bishop Construction Company, of Montreal, has been awarded the contract for building that part of the Quebec & Saguenay Railway between Cape Tourment, the present terminus of the old Quebec, Montmorency & Charlevois Railway, now known as the Quebec Railway Company, to Murray Bay, P.Q. It is expected that the line will eventually be extended along the north shore as far as Tadousac, where an all-the-year-round port will be established. Tadousac, noted for its attractions as a summer resort, is situated below Quebec city on the St. Lawrence River at the entrance of the Saguenay River. The principal object of building a railroad along the north shore of the St. Lawrence River is to advance the possibilities of Tadousac becoming an all-year port. The Bishop Construction Company is organizing its forces so that work can be started at the first sign of spring. Construction of this line is considered quite difficult, from the fact that the roadbed must be hewn out of the side of precipitous cliffs overhanging the St. Lawrence.

Operating Methods in a Filtration Plant

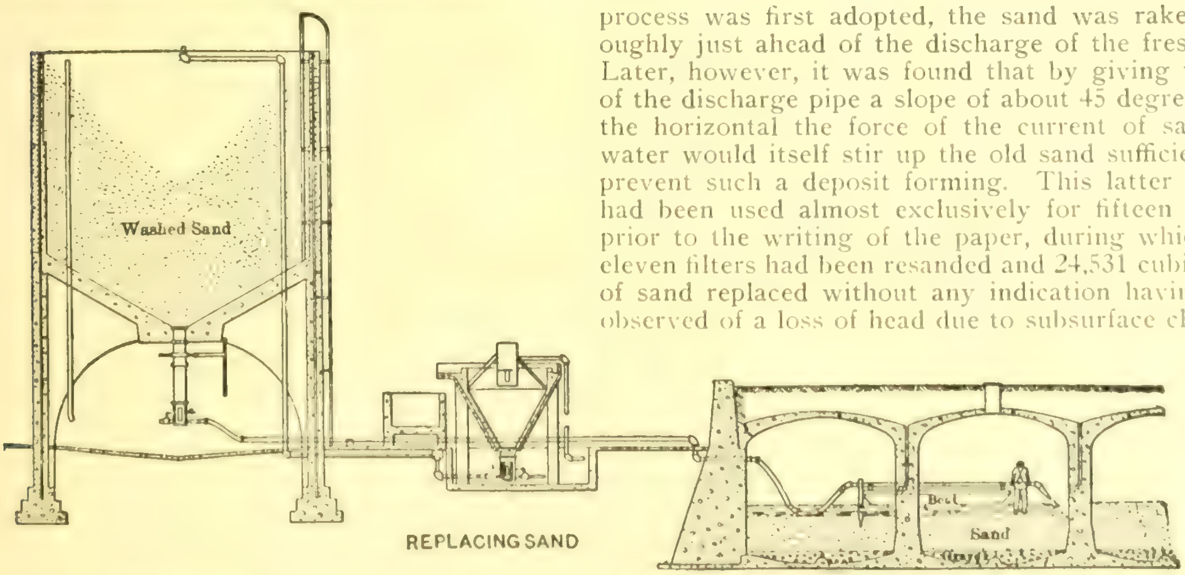
Interesting Data from Washington, D.C.—Replacing Washed Sand by Ejectors — Amount of Sand Removed by Scraping — Costs

In a paper before the American Society of Civil Engineers, Mr. E. D. Hardy, superintendent of the Washington, D.C., water purification plant, gave a description of some of the methods employed and results obtained during five years' operation of the plant. One of the most interesting of these is the manner of handling and washing the sand. His description of this we abstract as follows:

"For the first three years of operation the sand was carried from the sand bins in carts and dumped through the numerous manholes of the filters into chutes, the lower ends of which could be pointed in any direction so as to facilitate the spreading of the sand evenly over the surface of the filter. About the middle of 1909 this method was abandoned for the use of sand ejectors. The sand had from the first been remover from the filter by portable ejectors, by which it was transported by water through pipes to the sand cleaning apparatus. The ejector for transporting the washed sand from the bin to the filter is very similar, and is either attached to or placed directly under the outlet gate of the sand bin. From the ejector the sand which flows into it from the bin is carried through a line of 4-inch fixed pipe to the interior of the filter; one or more lengths of 3-inch hose on the end of this pipe permitting the sand to be distributed over all parts of the bed at will. In resanding a filter it is first filled with water to the proposed depth of the sand layer. To the outlet end of the hose which distributes the sand is attached a 3-inch pipe which is supported on a boat, and the sand is discharged through this pipe to the point required. Work is first begun at the far end of the filter, and the boat is gradually swung from side to side of the filter and at the same time backed toward the front end. At first it was feared that during the filling a small quantity of mud would be deposited on the surface of the old sand, and covered by the new layer, and that this mud would ultimately cause subsurface clogging. For this reason, when the process was first adopted, the sand was raked thoroughly just ahead of the discharge of the fresh sand. Later, however, it was found that by giving the end of the discharge pipe a slope of about 45 degrees from the horizontal the force of the current of sand and water would itself stir up the old sand sufficiently to prevent such a deposit forming. This latter method had been used almost exclusively for fifteen months prior to the writing of the paper, during which time eleven filters had been resanded and 24,531 cubic yards of sand replaced without any indication having been observed of a loss of head due to subsurface clogging. The filters resanded in this way have been considered more efficient than those in which sand was replaced with carts.



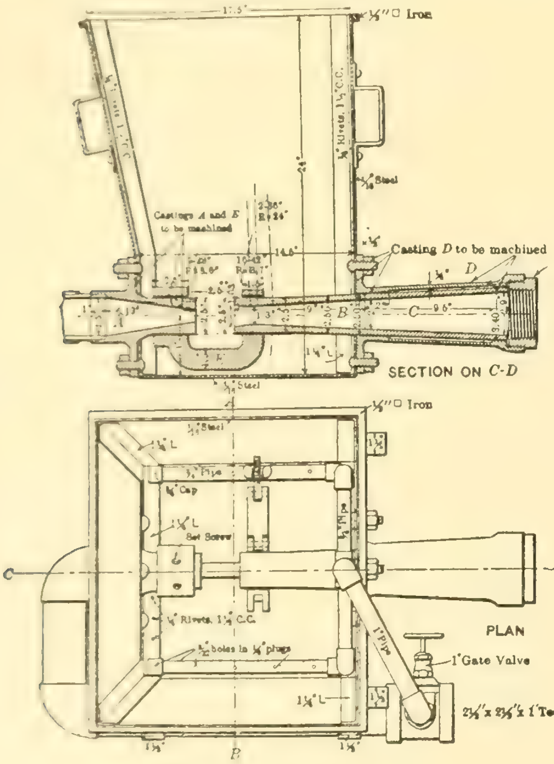
WASHING AND STORING SAND



REPLACING SAND

Diagrammatic Sections showing methods of Removing, Washing and Storing Sand, and Returning and Placing the Cleaned Sand

During the year 1909-1910 the average depth of sand removed per month by scraping was 1.314 inches, there having been three months in which no sand was removed and one month (March, following a month when there had been no scraping) in which 3.64 inches were followed. In removing the sand from the filter the average monthly rates in cubic yards per hour during 1909-1910 varied from 6.2 to 11.8, the mean of the monthly rates being 9.2. In replacing the sand by ejector the average rate per cubic yard per hour varied from 7 to 17.7, the mean being 10.0. The cost of handling the sand, not including any charge for the quantity of water used, during the fiscal year 1909-1910 was as follows, the items being per million gallons pumped to the filter: Scraping averaged 5 cents, ranging from 2 cents to 10 cents. Ejecting averaged 10 cents, ranging from 3 cents to 21 cents. Washing averaged 1 cent, ranging from 0 to 4 cents. Smoothing averaged 1 cent, ranging from 0 to 2 cents. Raking averaged 1 cent, ranging from 0 to 2 cents. Resanding averaged 8 cents, ranging from 1 cent to 27 cents. The total cost averaged 26 cents, ranging from 9 cents to 57 cents. Stated in cost per cubic yard of sand handled, the monthly averages were as follows: Scraping, average 7 cents, ranging from 6 cents to 12 cents. Ejecting, 14 cents, ranging from 9 cents to 25 cents. Washing, average 2 cents, ranging from 0 to 4 cents. Smoothing, 1 cent, ranging from 1 to 2 cents. Resanding, 10 cents, ranging from 5 cents to 17 cents. Total cost per cubic yard of sand, general average 34 cents, the monthly average ranging from 25 cents to 51 cents.



Details of Sand Ejector

The cost of pumping water for removing and washing sand, including all labor, materials and repairs, was 6 cents per cubic yard of sand ejected and washed; and 3 cents per cubic yard was the cost of water for replacing sand. The latter should be increased by one or two cents on account of the fact that while sand is being replaced a slight upward flow is maintained through the filter. This upward flow is not believed to be absolutely necessary but is always used as an additional safeguard against the formation of a layer of mud on the old sand.

A flight of stairs has been erected in Paris over which 14,000,000 persons have shuffled without so much as scratching the surface. These steps are almost as imperishable as if they had been built of huge diamonds, for in the concrete of which they are constructed a generous proportion of carborundum has been introduced and since carborundum is almost as hard as the diamond, it has given the concrete a wearing quality which no marble or granite could possibly approach.

In a cartoon published in the April number of one of our exchanges, reciprocity with the United States is depicted as an April fool joke in the shape of a brick concealed in a hat and laid temptingly in the way of an ingenuous-looking little boy who is just contemplating his opportunity.

Erratum—The Toronto office of Messrs. Escher, Wyss & Company have notified us that the plant referred to in a paragraph published on page 33 of our issue of March 29, 1911, is the Adamello power plant (head 3,000 feet) in northern Italy, and not that at Isola. The latter plant, however, was also built by the Zurich firm, the head being 1,200 feet and the output of each of five being 2,850 h.p.

The use of a water sprinkling apparatus attached to the steam road roller has effected a considerable saving in road work in the Uxbridge Rural District, England. In his annual report the engineer of the district states that before fixing sprinkling apparatus on the roller it was necessary to hire a horse and man for the water cart the whole time the roller was working, at a cost of never less than $1.68 per day. The engineer also states that the substitution of coke for coal for the steam roller has resulted in a saving. He has found that a chaldron of coke (2,500 to 2,900 lbs.) at $3, lasts as long and does as much work as a long ton of coal at $4.32.

It is safe to predict that before very long the name "Portland," as applied to cement, will be spelled with a small "p." The word is already almost a common noun, in such wide and common use to designate a definite and well-known product that the origin of the name is ordinarily lost sight of. In such cases it is the inevitable tendency of common usage—and usage, in the long run, determines what is proper in style—to drop the capital letter. So we shall some day read of American as compared with foreign "portlands," just as we now read of American plaster of "paris," "cyclopean" concrete work, international "boycotts," and the "herculean" tasks that confront the political campaign managers in 1912.—Cement World.

Fred. Cook, of the Press Gallery, Ottawa, has in preparation a "Who's Who in Canadian Manufactures and Industries," which should have a wide field of usefulness in this country. Forms are now being circulated.

The Grand Trunk Pacific Railway, B. B. Kelliher, Chief Engineer, Winnipeg, Man., proposes to construct large grain elevators at West Fort William on Lake Superior. The scheme includes three big piers devoted to the grain traffic, on which will be placed six elevators of 10,000,000 bushels capacity each. The plans provide for the handling of 2,400 cars a day in these elevators.

The Selection of Contractors' Outfit

Considerations Second only in Importance to Actually Obtaining the Work — Proper Equipment Means Economy, Efficiency, Success

By Daniel J. Hauer

Next to obtaining contracts there is no more serious problem that is presented to the contractor than that of purchasing outfit or plant to perform his work. At one time tools and machinery were spoken of almost entirely as "contractor's outfit," but to-day the term "plant" is used extensively, especially in connection with charges regarding this item of expense. No doubt the newer term will entirely supplant the older one.

The question of how much is needed and also the proper kind of plant should be a matter of careful consideration. Then, too, it is necessary to take stock of what outfit is already on hand and determine if it can be used to advantage on a new job. A contractor's experience must, to some extent, be his guide in reaching a decision on such matters. Also the amount of capital he controls will be a ruling factor. That mistakes are made in this connection need hardly be stated, and considerable money is lost by errors in judgment and through ignorance in selecting the proper outfit to use. Some contractors seem to believe that any makeshift is good enough, while in reality they are losing money by not having the proper machinery. Some expensive tool may have been used on one job, having been selected for its adaptability to that particular piece of work. For the next contract it is not so well adapted, yet instead of selling and trying a new style or size machine, the old one is worked, relying on the ingenuity of the contractor or the friendship of the engineer to pull the job through to a successful finish. Contractors as a class seem to be too bigoted and allow their prejudice to warp their judgment in this matter. There was a day when prices were high and conditions were better so that almost any man could make money at contracting, but that day has passed as the business has become a profession. To make money at contracting it is necessary to practice economy in the true sense of the word, surround one's self with competent men and outfit suited to the work. Thus contractors should on the lookout for new inventions and styles of tools and also try to adapt tools gotten up for other work to their own.

Even in the case of small tools and implements this is true. Many contractors seem prone to use only such tools as have been in use for years and to pay but little attention to improved styles of tools. This is quite noticeable in regard to wheelbarrows. There are now numerous styles and sizes of barrow made, that are designed for special work, and savings can be effected by using these special wheelbarrows, yet many contractors only buy one style of barrow, and use this on all jobs. Thus a contractor using barrows for excavating foundations will use the same ones for the concrete work, for which purpose they may be entirely unsuited. The beds of barrows meant for earth are too shallow and not shaped properly for concrete, for with extremely wet mixtures only two or three shovelfuls of concrete can be handled without the concrete slopping out on the sides. Earth barrows are not even suited for the raw materials for concrete, but a wheelbarrow with a high front and sides, yet admitting quick dumping of its contents, either over the front or sides, should be selected.

In most cases it is advantageous in hauling concrete to use a concrete buggy. These carry a much larger load and, if the proper runways are laid down, will allow of the concrete being handled much quicker by the men, and at the same time considerable labor will be saved. The writer knows of a foundation job, where an average of seven hundred cubic yards of concrete were handled each day with these buggies. The men not only carried a large load, but were able to move at a trot without letting up on this pace during the day.

For some work, even a larger amount of concrete can be carried by a push cart. Several such carts with an automatic end gate for dumping are on the market and from one-half to one cubic yard can be carried in a single load. A serviceable push cart, not only for concrete work, but also for earth excavation can be built by any contractor's blacksmith.

Conveying Concrete

In many cases concrete or the raw materials for it are being transported by hand when conveying machinery should be used. Bucket and belt conveyors have been used quite extensively and can be adapted to many conditions, and are found quite economical for large quantities. Chutes and pipes are also being used for conveying concrete. Various patented hoists are used, and from the hoisting towers the concrete is distributed to the forms.

There are many kinds of concrete buckets and most of them are patented. Some are meant to dump under water, some are for use on cableways and derricks, some are designed to dump in narrow forms, and some on large, flat surfaces. Some are constructed so that they may be used as buckets and also as the bodies of dump cars. Orange peel and clam shell buckets have not been used in connection with concrete as extensively as they should. Whenever and wherever they have been tried money has been saved. For rehandling sand and aggregate they are valuable as they not only dump automatically but load in the same manner when concrete is discharged into hoppers, these buckets can be used for placing the concrete, allowing the mixer to work continuously.

Experiments have of late been made to convey concrete through four-inch pipes by means of compressed air. Some of the experiments have been successful, while others have only been partially so, but there seems to be little doubt that concrete can be and will be transported in this manner, and for some classes of work the method should prove economical.

There are many makes and styles of concrete mixers on the market, and all of them no doubt possess some merit, but they differ very materially both in the quantity and quality of the concrete which they will mix. Then, too, they vary as to their maintenance and the care that must be given them. Some makes are frequently out of order, so that much money is lost by men waiting for repairs to be made. Then, too, [illegible] machines are poorly adapted to certain classes of work, and in buying and using these facts must be considered. Likewise the method of charging should be taken into consideration. One thing seldom investigated by contractors as it should be is the horse power needed to run a mixer. Mixers vary exceedingly in this respect. For small boilers exposed to the weather a single horse power saved means the saving of seven pounds of coal per hour.

Economy of Bins and Hoppers

Bins and hoppers, too, are useful and economical in connection with concrete mixers. Not make-shift affairs, but well designed and constructed bins should be used. For most purposes hopper bottom bins are to be preferred. When this bin is divided into several compartments, to hold different materials, and the bin is to be filled by means of dump buckets, then the top of the bin should be sloped towards the operator, who handles the buckets, so that he can see as he dumps the material, thus preventing it from being mixed. Bins can often be built in sections so that they can be taken apart, and assembled again after being moved, while others can be mounted on wheels and moved at will.

Wagons are used extensively by contractors, and for so many different purposes, that the selection of the proper wagon for each purpose is of importance. For earth hauling and similar work the patented dump wagons, of which there are many makes on the market, are superior to any other style of wagon. It is true that a very good substitute for a dump wagon can be made by using scantlings or poles for a bottom and 12 to 14-inch planks for the sides and an ordinary running gear. These are known as "slat bottom wagons," and for long hauls can be used to advantage, but a man on the dump is absolutely necessary as some one must assist the driver in dumping. The frame can be set in place just before the wagon is loaded. It takes about two minutes to dump a slat bottom wagon, while it is possible to dump a drop bottom patented wagon without stopping the team and latch up the bottom on the way back. It is easily seen that not only much time is saved when a large amount of excavated material is to be hauled, but less wagons will be needed.

Some writers have stated that slat bottom wagons are justified for long hauls, as the time on the dump needed to unload is necessary to spell the horses. On long hauls horses can be spelled, even with drop bottom wagons, and a man is saved on the dump. The only excuse for using slat bottom wagons would be that the amount of material to be hauled does not justify the purchase of dump wagons. To-day, though, dump boxes to fit any running gear can be purchased, and used even for a small amount of material.

One objection to dump wagons is that they are of little use for moving any material that will not dump by gravity, nor are the beds shaped for hauling material which comes in large pieces. There should be no question as to the use of dump wagons when material that can be dumped is being hauled daily, but when wagons are to be used for other purposes, then a contractor should have the ordinary wagons, with their beds and dump boxes for earth and such materials. Dump boxes are valuable, but for regular daily work they are not as economical as the dump wagons.

For some purposes rear end dump wagons should be used. There are a number of different styles for a different purpose. Most of them have higher bodies than the drop wagons, but as a rule they are of greater capacity.

Dump Cars

The size and character of dump cars to be used for different works is sometimes a difficult problem. Cars may be divided first as to their size. Those of three cubic yards capacity or less are classed as small cars. Other sizes range up to 40 cubic yards capacity and are classed as large cars.

In considering any car proposition one should bear in mind that if the contract is one that demands a certain style of car, and the job is large enough to pay interest on the amount needed to purchase the cars, naturally the special cars should be bought, but if the amount of work is only nominal, then it may not be economical to purchase a special car, but rather one that will be adapted to the work and also be useful for other purposes. This rule is applicable to the purchase of any large amount of equipment.

Small cars for transporting earth, concrete and similar materials are generally more economical than carts, cars, wagons and other vehicles, for short hauls, provided there is enough work to be done to justify laying the track. This, however, is a small item, when "industrial tracks" are used, for these tracks come in sections, with metal ties fastened to the rails with clip bolts, and can be laid in position and fastened together quickly. Regular rails laid on steel or wooden ties can be used, and for small cars even a wooden rail proves satisfactory.

One advantage that small cars have over other vehicles for transportation is the fact that one horse can pull or operate more than one car. If the haul is short, even though the grade be steep, one horse will pull one car, while a second car is being loaded, and will move the second car after returning the first to be loaded. Thus, at least one and possibly two or three horses are saved. Cars with a capacity of less than one cubic yard can also be pushed for short distances by men.

On level grades or on descending grades one horse can often pull two or three small cars, so that they can be operated in trains. Hoisting engines can also be used for this purpose, and at times gravity can be utilized to move the cars, using power only in one direction or for a very short distance. On the down trip both wooden and steel cars are used, the steel cars dumping more cleanly. The latter are thus to be preferred for concrete. Small cars are made in many different styles, yet they can all be grouped into two classes—side dumps and rotary dumps. There are a number of different kinds of side dumps, although all are either "one-way" or "two-way" dumps. A very common kind of two-way dump car in use to-day is the V-shaped, rocker car. This is easily handled by one or two men and can be tilted to load easily.

Rotary dump cars are especially useful in building embankments as they can dump over the end of the bank, thus saving building a trestle from which to dump. Then, too, they can be loaded from any side, and as one end is open for dumping purposes, it makes the car lower, which is an advantage when loading by hand.

Large dump cars are used in connection with steam shovels or other loading machinery, or for ballasting track. Other styles of cars used for these purposes are: flat cars and gondolas with swinging sides that are unloaded with a large plow or unloader. The dump cars either dump through the bottom or the side, or a combination of the two. Some have a great range of dumping, and spread the material as it is dumped, while others must have powerful spreaders to follow after them.

For steam shovel work the large patented dump cars do not seem to be in favor with most contractors. One reason, no doubt, is that the price is high, while another is that some are leased and not sold. There can be little doubt that one of the economic blunders made in most steam shovel work is that the cars used are too small. Even though the same yardage is carried, the large cars mean more economical train operation, as the journals of the cars are larger, the wheels likewise being larger and better made. Brasses do not wear out quickly, and the length of the train being shorter it is controlled by the locomotive more readily. As a rule, though, the yardage carried in a trainload of large cars will be greater than that composed of smaller cars. The smaller cars, such as four, six and eight cubic yards capacity, are generally built for a narrower gauge track than the larger cars. For some purposes the three-foot gauge is well adapted, but in the writer's opinion, the standard gauge track is the best for most construction work. In the latter case cars and engines are better balanced and operate more easily in proportion to their loads, the track laid is generally more substantial, supplies of coal and other materials for the work can be hauled to their place of destination over the contractor's track. This last point alone may mean many thousands of dollars on an extensive job.

Power Drills Effective and Economical

There is much money lost by contractors on railroad construction by failure to use power drills. In some sections drills are being used extensively and the use everywhere is growing rapidly. Even for light work hammer drills can be used. The cost of a drill and light boiler hardly exceeds $500, and its work would so far exceed that of men with striking hammer or churn drills as to more than pay the interest and depreciation in a year's time. Certainly power drills should be used on all tunnel work, yet even to-day tunnels are being driven by hand.

Even in the matter of hand shovels and picks care must be exercised in selection. Picks vary much in their length and weight, and are pointed differently. Stone picks, railroad picks and contractor's picks are all meant for different kinds of work, and are economical each in its own place. Yet many contractors use the same style and weight of pick for all purposes.

The same thing is true in regard to shovels. Many contractors think any old shovel will do, but a different shovel is needed for concrete work than that for earth digging or rock shoveling. There should be long handled and short handled shovels in every outfit. Round pointed shovels are used for rock, and square pointed for earth. Spades, too, in stiff plastic clay, are useful and it is well to have some on every job, as a man in some materials can save all the picking.

A great waste in a small item sometimes results from the use of the wrong kind of hand buckets. The one in most common use is the galvanized iron bucket, which is soon bent out of shape. A well made bucket should be used, and although their price may seem high, yet much money is saved with such buckets. There are now sold a number of styles of good buckets manufactured especially for use by contractors.

Scrapers are not always used when they should be, nor are the proper kind always employed. In the western states brick scrapers are used extensively on railroad embankments and canal work, yet one seldom finds them among a contractor's outfit in the east. The conditions in the west are more suitable for brick scrapers, but they could be used to excellent advantage in the southern states and other parts of the east. Four-wheeled scrapers are very useful tools, yet few contractors have used them.

There are many kinds of excavating machines on the market to-day, yet we see much work that could be done by machinery being executed by hand. This is especially so of trench work. There are a large number of very successful machines in use for excavating trenches and ditches.

Clam shell and orange peel buckets are very economical excavating tools. In connection with derricks and derrick cars and dredges their range of work is extensive. These buckets are built for hard and soft digging, and as the number of men needed to operate them is small, the cost is very low.

Steam shovels are money makers, yet losses are often sustained through serving them with insufficient trains or with outfit of the wrong kind.—The Contractor.

Certain Considerations Affecting the Selection of Bitumens and Mineral Matter*

Everywhere highway engineers are giving much thought to the use of bitumen in the construction of macadam roads; and while the standardization of specifications for bitumens in the forms of oil, asphalt, tars and pitches is probably near at hand, I believe that sufficient thought is not being given generally to the mineral matter used in conjunction with the bitumen. Whether the bitumen be used in the body of the roadway, or to form a waterproof and resilient mat on the surface to protect the macadam from wear by abrasion, the results from this form of road construction will largely depend upon the mineral matter and its suitability for the bitumen used. The same difficulty was experienced in the first sheet asphalt pavements that were laid.

In the construction of bituminous roads and pavements, I am of the opinion that a great many bituminous materials, when properly used, may prove entirely satisfactory, but that the use of these same cementing products may result in complete failure, if the mineral matter has not been suitable. Not only may the cementing properties of most bitumens be lost by the use of too much mineral dust, but whether oil, asphalt, tar or pitch is used, it is also fully as essential to study the character of the available mineral matter, as it is to determine the nature and character of the bitumen to be used.

Experience has shown that the life of an asphalt or bitulithic pavement depends as much upon the character of the aggregates as it does upon the cementing bitumen, and this theory holds good in the formation of a bituminous concrete or a bituminous wearing surface for a macadam road.

Different bitumens vary in their ability to penetrate the mineral matter. Coal tar products posses a penetration property not usually found in oil-asphalt cements, and further in using these last in the construction of a bituminous macadam road, it is necessary that the stone be free from dust to secure proper adhesion. With the coal tar products this precaution is not so essential, but in a broad sense, mineral dust

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* Paper by Jas. C. Travilla, Street Commissioner, St. Louis, Mo., presented at the recent meeting at Minneapolis, Minn., of the American Association for the Advancement of Science.

[illegible] objectionable as moisture in the construction of bituminous roads.

The life of a bituminous road or pavement depends as much upon the wearing qualities and the grading of the mineral matter that forms the roadway surface, as it does upon the adhesive and cohesive properties of the bitumen.

A soft limestone wearing surface of a bituminous macadam road, provided the road be constructed according to the generally accepted practice of placing the large stone on the bottom, will not prove a success if subjected to heavy traffic. If the process of construction be reversed, however, good results may be obtained, since crushing strength varies as the square of the lineal dimensions. This method affords stability in road construction that cannot be obtained in the usual way. The life of the road may be increased by a cushion coat of fine material matter to absorb the impact of the calks of the horses' shoes and to lessen the abrasion caused by steel wagon tires.

My experience in the construction and maintenance of roads and pavements leads me to believe that the nearer the approach to a resilient wearing surface, the longer will be the life of the road or pavement. For example, a treated wood block pavement is to a certain degree resilient which adds to its life and increases its desirability; extremely hard-burned vitrified brick will not wear as uniformly nor as well as softer brick and where a cushion coat of clay or sand only a fraction of an inch in depth is maintained over the surface of the brick, the life of the pavement is greatly increased; an asphalt pavement in which the cement is very hard will wear much more rapidly than one in which a softer cement has been used, and likewise, the squeegee coat of a bitulithic pavement adds much to the life of the latter. Not brittle at low temperature, nor extremely soft at high temperature are two desirable requirements characteristic of resilient road construction bitumens.

The statement that certain heavy road oils on the market "carry" a certain per cent. of asphalt, does not mean much to a road engineer familiar with their use. It is admitted that the greater per cent. of asphalt, the better the oil for the work; but an oil carrying sufficient asphalt to have adequate adhesive and cohesive properties for making a bituminous concrete or bituminous wearing surface, is other than what is ordinarily sold for the purpose. Such an oil-asphalt product could not be handled in the tank cars now in the service of the oil companies, since they do not possess the necessary steam coil capacity to raise the temperature sufficiently high for successful handling.

Grades of Oil for Surface Treatment

St. Louis has specifications for four grades of oil for surface treatment, and from careful study of results during the past three years, I am fully satisfied that there is place for each grade.

The grades of oil used are as follows:

No. 1.—Residuum oil, having a gravity of 30 deg. Be., it is applied cold and is used on cinder roads and for the purpose of giving life to the surface of a road that has previously been treated with a heavier product and is becoming dusty. Being merely a dust layer, it should not be considered as having any binding properties.

No. 2.—Residuum oil, having a gravity of 20 deg. Be., it is applied hot and is recommended for park roads and roads that are not main arteries of travel.

No. 3.—Residuum oil, having a gravity of 16 deg. Be., it is applied hot and is used on the main thoroughfares having a mixed traffic and acts as a temporary binder for the mineral matter.

No. 4.—An oil-asphalt compound having a gravity of 12 deg. Be., it is applied hot and is recommended for any type of road, since it simply forms a binder for the mineral matter which actually bears the traffic.

In the use of all the grades of oil referred to, with the exception of No. 1, there should be a covering of mineral matter, uniformly distributed over the surface of the oil to a depth of from 1/8 to 1/2, depending upon the amount and gravity of the oil applied.

The work of treating a road surface after applying the oil and mineral matter is not completed for several weeks. As soon as the road is open for traffic, it is necessary to give it attention for some time to take care of any wet spots that may appear.

It must not be presumed that surface treatments will provide a dustless roadway from April to November, without any additional work. What would be the appearance of any improved street, under heavy traffic, if not properly cleaned for a period of six months? It is therefore necessary to properly patrol treated road surfaces to keep them in a cleanly condition. It is also essential that all road intersections be treated, as the dust and dirt carried onto a road will materially shorten the life of the treatment.

When traffic and road conditions have been ideal, we have had surface treatments last through two summers with every indication of at least a year or more of wear without attention other than the maintenance. This condition, however, will not exist on the average highway and it is not reasonable to presume that a road receiving such a wearing surface should have a long life. The cost of treatment being inexpensive, considering the results, the work may be done each year.

Care Needed in Concrete Work

The Cleveland Chapter of the American Institute of Architects, the Cleveland Engineering Society and the Builders' Exchange joined in appointing a committee to investigate the collapse of a four-storey reinforced concrete building which was being erected for the Henke Furniture Company, of that city. The collapse was a disastrous one accompanied by the death of four persons and the injury of seven others. The commission paid nine visits to the ruins, held seventeen public sessions at which eighty-six witnesses were examined, besides twenty-eight private sessions.

The commission held that the initial failure was due to the premature removal of forms and supports in the third storey, and found that the architectural supervision was deficient, that the concrete used was of poor quality and not properly placed, while the owner and the city had a share in the responsibility for failure to watch the work and enforce the ordinances. The conclusion of the committee was that the collapse gave no reason to condemn the use of concrete in combination with steel, provided the concrete was composed of proper materials, accurately measured and thoroughly mixed; the steel sufficiently strong and properly placed; the work installed by competent contractors and workmen; and the specifications, drawings and construction properly executed under the direction of competent designers and inspectors.

Initial Cost of Concrete and Wood Piling

Fallacies Entertained by Architects and Owners The Respective Merits of Both Forms of Construction Comparison of Actual Costs

By Philip J. Kealey

When, in the construction of any large building structure, an investigation of the foundation site has shown that piling will have to be used, the engineer or architect is immediately confronted with the advisability of selecting either of two types, wood or concrete.

In this selection of the kind of piling many things will undoubtedly be considered by the engineer, such as the permanency of the concrete piling, the ability of securing a perfect bond between the pile and the foundation piers of footing, and the additional loading which a concrete pile will safely carry compared to a wood pile. Also, since concrete piling is comparatively new, the engineer will probably consult with the agents of a concrete pile, who, feeling that the burden of the proof is in them, will bring forth many additional arguments as to why concrete piling should be used and why wood piling should not be considered. They will show that wood piling is only safe from decay when below the ground water line, necessitating considerable excavation and extra concrete in the piers to bring the work up to the grade of the top of concrete piles, which of course can be left protruding if desired. Then it will be proven that by the constant lowering of sewer grades in many of the cities, this ground water line is being lowered with the result that pile foundations which were all right a year ago may be unsafe and dangerous to-day, and an expensive rebuilding of them becomes necessary. Many other arguments favoring the use of the concrete pile will be brought out, but Mr. Architect interrupts to ask what the piling will cost his client. The answer in all probability is that the concrete piles will cost about $1 per foot in place, while timber piles can be secured at a price varying from 22 to 30 cents per foot driven. At once the favorable impression created by the concrete pile agents begins to vaporize, the owner is consulted and nine chances to ten he wants to economize in every way possible, so that when assured by his engineer that the wood piles are safe, he decides that the concrete piles are an expensive luxury and the former are driven. In vain the concrete pile engineer shows that while the initial cost may be more, the investment is permanent and no depreciation takes place, and that less feet of concrete piling will be required to support the same load than will of timber. The difference in initial cost is a disparagement too great to overcome.

It is to show the fallacy of the conclusion arrived at by the architect and owner in the above paragraph that this article is written and to prove that even on the prices quoted the first cost of the concrete piling will be less expensive in many cases. The cost data hereinafter given were carefully collected. The conditions under which the work was prosecuted were most favorable and the unit prices are quite reasonable.

In the erection of a large industrial shop in the Chicago district during the summer of 1910, a pile foundation was necessary and the question as to the kind of piling arose. The building site was on filled ground, near a river, with the ground water line approximately 14 feet below grade, and the piling depended largely on skin friction for bearing power.

A proposal was made to furnish concrete piles at $1 per foot, but wood piles were selected because they could be secured at 23½ cents per foot in place. The piles were designed to carry 20 tons each and the number of piles varied from 4 to 9 under each pier. The contractor was allowed 12 cents per foot for each foot followed.

Driving.—The following is the cost data on the pile driving operation:

Total piles driven, approximately	1,250
Total linear feet driven, approximately	50,000
Total linear feet followed, approximately	6,000
Actual cost of pile (to company) per foot driven	25.15 cts.
Actual cost of one pile (driven)	$10.21

The piles were driven during July and August.

Sawing off Heads.—The piles were cut with a cross cut saw about 4 feet long worked by two men who received 35 cents per hour each. The heads were hoisted out by a three-leg derrick and single block, six men being required to hoist up and dispose of them. These laborers received 25 cents per hour. Water existed in many of the holes which varied from 12 to 15 feet in depth. The average cost to cut off each head, get in out of the hole and dispose of it was 38 cents. The unit cost varied from 17½ cents to $1.35.

Excavation.—The cost per cubic yard for excavation was $2, which price included back-filling. The pier holes were in many instances full of water, entailing pumping, sheeting was necessary to prevent caving, double and triple casting of dirt was frequently required and much of the material handled was slush, so that the price per yard was not excessive. The amount of excavating required for various size piers and the cost per pile was as follows:

4 piles 6x6x14.5=19.3 cu. yds. at $2=$38.60, or $9.65 per pile.
5 piles 6.5x6.6x14.5=22.7 cu. yds. at $2=$45.40, or $9.08 per pile.
7 piles 7x7x14.5=26.3 cu. yds. at $2=$52.60, or $7.51 per pile.
9 piles 7.5x7.5x14.5=30.2 cu. yds. at $2=$60.40, or $6.71 per pile

The majority of the piers rested on the smaller number of piles so that the average cost of excavation per pile was $8.61.

Concrete Caps and Piers.—The cost of the concrete work in the piers was $5.40 per cu. yd., the contractor furnishing all materials and forms. From the detail drawings the cubical contents of the piers are found to be as follows: 4 pile, 6.3 cu. yds.; 5 pile, 6.8 cu. yds.; 7 pile, 8.0 cu. yds.; and 9 pile, 8.7 cu. yds. At $5.40 per yd. the cost of the concrete work in place was as follows:

4 pile 6.3 cu. yds. at $5.40 = $$34.02, or $8.50 per pile
5 pile 6.8 cu. yds. at $5.40 = $36.72, or $6.17 per pile
7 pile 8.0 cu. yds. at $5.40 = $43.20, or $6.17 per pile
9 pile 8.7 cu. yds. at $5.40 = $46.98, or $5.22 per pile

The average price per pile for the concrete cap and the pier from cap to footing grade, was $7.15.

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* In Engineering-Contracting.

Recapitulation.—From the foregoing figures the following table summarizing the cost of a pile in the various size piers is obtained:

	Cost Per Mile.			
Item	4 pile	5 pile.	7 pile	9 pile.
[illegible]	$10.21	$10.21	$10.21	$10.21
Sawing heads	0.38	0.38	0.38	0.38
Excavating and backfill	9.65	9.08	7.51	6.71
[illegible]	8.505	7.34	6.17	5.22
	$28.745	$27.01	$24.27	$22.52
	4	5	7	9
Cost of completed pier	$114.98	$136.01	$169.89	$202.68

Concrete Piles.—Numerous tests have shown that where the loading is supported by skin friction, a short tapering concrete pile will sustain as great or greater a load than a long wood pile and for that reason it was proposed to use 24 ft. piles on this work had concrete piles been selected. In tests made in just such soil conditions as existed in this case, it was demonstrated that the concrete piles could stand from two to three times the loading, without settlement, that the wood piles could carry, but in order to be conservative 50 per cent. greater loading is assumed for a comparative basis of cost. The cost of a 4 pile cluster (assuming same loading as on wood piles) of concrete piles would be:

Piling, 4 at $24	$ 96.00
Excavation for cap at 2 cu. yds. at $1.00	2.00
Concrete in cap 2 cu. yds. at $5.40	10.80
	$108.80

Assuming 50 per cent. greater bearing power, piles to be driven on 2 ft. centres, the cost of a 4 pile cluster would have been:

Piles, 3 at $24.00	$72.00
Excavation, 2 cu. yds. at $1.00	2.00
Concrete cap, 2 at $5.40	10.80
	$84.80

This is a saving of approximately 26.5 per cent. of the initial cost of the wood piles. Upon the same premises, the cost of the different size piers would have been as follows:

Cost of Concrete Pile Piers

Number of wood piles.	4	5	7	9
Cost of concrete piles	$72.00	$96.00	$120.00	$144.00
Cost of excavation	2.00	2.00	3.00	3.00
Cost of cap	10.80	10.80	16.20	16.20
Total cost	$84.80	$108.80	$139.20	$163.20

A comparison of the cost of the complete wood pile piers necessary to take care of the same loading, with the concrete piles and the per cent. saving in initial cost in favor of the latter is shown in the following table:

Size of Wood Pile Piers.

	4-pile.	5-pile.	7-pile.	9-pile.
Concrete	84.80	108.80	139.20	163.20
Wood	114.98	135.05	159.89	202.68
Per cent saving in initial cost	26.4	19.45	18.1	19.5

It is evident from the above figures that a saving of over 20 per cent. of the initial cost of the foundation work would have been effected by the use of concrete piles, under the conditions which existed on this job. This saving is brought about by avoidance of expensive excavation and deep concrete piers necessitated by the wood piling and would be approximately the same percentage in the nine-pile cluster, as it is in the four-pile.

On further analysis, it would appear that where the ground-water line is 8 feet or more below grade, the initial cast of the foundation work below grade would be less if concrete piles were selected in preference to wood, although the cost of concrete piles would be $1 per foot and wood piles 25 cents per foot driven.

Competition for Plans for Working Men's Homes

The Model Homes Association of Ottawa has inaugurated a competition among architects' draughtsmen for designs of workingmen's homes. For some time the class of houses erected by builders for this purpose has not been satisfactory and the association is convinced that houses of better appearance and more adapted to the requirements can be erected at no greater cost.

The originator of the plan was Mr. C. P. Meredith, the well-known Ottawa architect. His Excellency, Earl Grey, and many leading government officials have become patrons of the association.

Circulars will be sent out through the Dominion so as to give all draughtsmen a chance to compete. Architects are invited to send in plans on a non-competitive basis. The best designs submitted will be reproduced and kept on file at the City Hall. These will be available upon application and for a small fee. The scheme will have no adverse effect upon the architectural profession inasmuch as the maximum value of the houses will be $2,500.

There are 18 classes of houses for which designs are asked and prizes of $15, $10 and $5 will be awarded in each class. The closing date for submitting plans is May 20. Full particulars may be obtained upon application to Mr. A. J. Hazelgrove, Hon. Secretary, Model Homes Association, 126 Sparks street, Ottawa.

The contract has just been awarded and work started in connection with the establishment of a Swiss Guides' Village in the Rocky Mountains one mile from the town of Golden, B.C. This enterprise is under the direction of the Canadian Pacific Railway Company, and will add one more attraction to the Columbia Valley. The novel little village will consist of six Swiss chalets which will be the home of as many mountain climbers and their families. The cottages will be attractively situated on the mountain side some 200 feet above the railway track, and they are to be all completed by September 1, when the families of the guides are expected to arrive in this country. For several years past it has been the custom for these guides to return to their homes in Switzerland at the close of the mountain climbing season, returning to Canada the next summer. This move indicates that the institution inaugurated by the Canadian Pacific Railway as an experiment a few years ago, is to be a permanent feature of tourist life in the Rocky Mountains. The name of the new village will be Edelweiss.

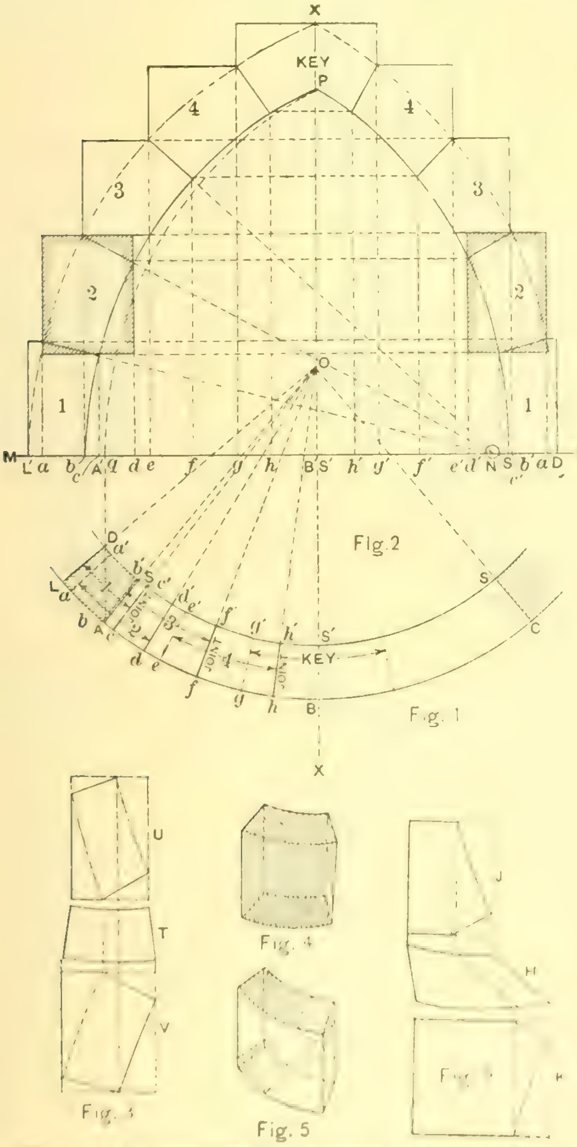
Although spring is rather late this year around the Ottawa Valley, Mr. J. A. Jamieson, manager of the Jamieson Lime Company, Renfrew, has already started his kilns to meet the demand of his large and growing trade. Renfrew Lime, put out by this company, is becoming known from one end of the country to the other for its superior quality. Users after paying the difference in freight rates through long haulage claim great saving and satisfaction. Mr. Jamieson last year took over the plant of the Renfrew Brick & Tile Company, which, with his own extensive plants, now places him in a better position than ever to meet the increasing demands for his products.

At Sydney, N.S., extensive works are being erected for the Dominion Iron & Steel Company. The total estimated expenditure is $4,000,000.

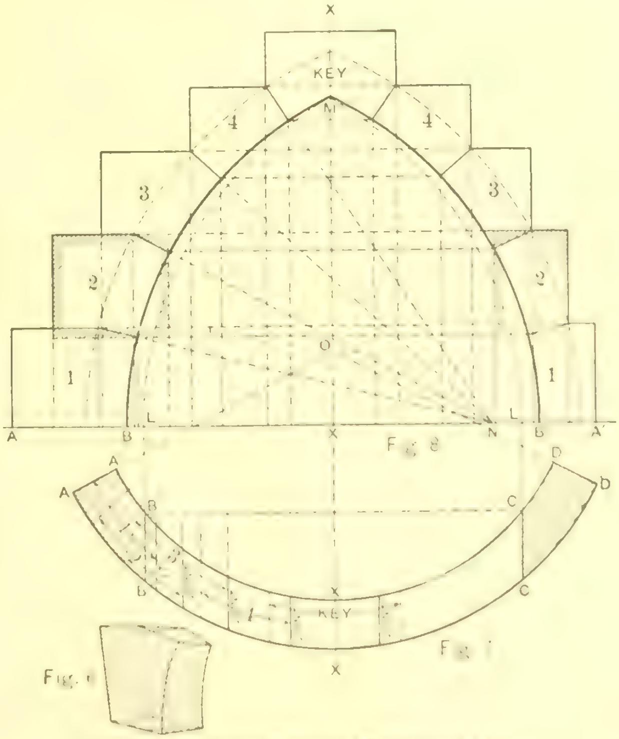
Problems of the Building Contractor

Developing the Soffit of a Gothic Arch in Stone—A Novel Form of Roof Construction—Bonding Layers of Concrete

The masonry problems which often confront the builder are of a nature to call for considerable ingenuity and skill in solving them, and one of the fields in which these problems are likely to arise with considerable frequency is in the construction of masonry arches of various kinds. In the sketches which are presented herewith are shown the method of developing the soffit of a Gothic arch in stone as demonstrated by Albert Watts, of Birmingham, England, writing to one of our London contemporaries. Fig. 1 represents a plan of the arch, Fig. 2 an elevation, while Figs. 3, 4, 5 and 6 clearly indicate the shape of some of the stones used in the construction of an arch having splayed jambs. In Figs. 7, 8 and 9 is represented an arch with square jambs.



Figs. 1 to 5, inclusive, Show Plan, Elevation and Details of Arch having Splayed Jambs



Figs. 6 to 9, inclusive, Relate to a Gothic Arch having Square Jambs

Developing the Soffit of a Gothic Arch in Stone

To develop the soffit of the arch indicated in Figs. 1 and 2 we first draw the plan A, B, C from the radius O to the circle required for the face line of the arch, marking off the opening of the arch A-C in plan.

Having determined the thickness of the arch, draw the lines A C radiating to the centre O, these lines giving the splayed jambs, while S S represent the opening inside the arch.

To set up the elevation, Fig 2, mark off the height of the soffit at P on the centre line X X, then develop the line L A B in plan and mark it off on elevation at L' A' B'. Having done this, draw the soffit A' P from the radius N, this being the development line of the soffit (the dotted line q P being the soffit line, square section). Divide the line A' P into the number of stones required and strike the joints from the radius N. Build up the stones as shown at 1, 2, 3, 4 key. Now drop lines from outside as shown at L', a, b, c, d, e, f, g, h. Transfer these to plan anad from each draw lines radiating to the centre O, the lines representing the soffit joints, and the dotted lines the back joints of each stone, thus giving the bed molds and the developed face molds 1, 2, 3, 4 for the outside of the arch.

To develop the inside of the arch lay out on the elevation the line D S S' in plan, then transfer the lines a', b', c', d', e', f', g', h'; protect these lines to the elevation and draw horizontal lines parallel to the springing line M M from the soffit joints and beds. Where the soffit lines intersect the lines c', d', f', h', draw the line S P through these points and we have the development of the soffit line inside the arch. From these intersecting points draw the joints to where the bed lines intersect the lines a', c', e', g', and we have the development of the inside face molds, 1, 2, 3, 4 key.

To work arch stones, No. 2, the molds required are the [illegible] mold [illegible], and inside face mold U, and outside face mold V, as shown in Fig. 3. The height of the stone is obtained from the elevation, which is shown by the shade lines. Commence by working the bottom and top beds parallel to each other, then apply bed mold on both beds and work it through, which will give a stone as shown in Fig. 4. Then apply inside and outside face molds, as shown by dotted lines, [illegible] the joints and soffit through and we get the finished stone, as shown in Fig. 6.

To develop the soffit of the square jamb arch, Figs. 7 to 9, proceed as described in the previous example. First set out the plan A B C D, A′ B′ C′ D′, Fig 7, then developing it out on elevation A B X X′ B′ A′, Fig. 8. Only in this case the inside elevation will be a little larger than that of the outside on account of the plan line B′ X′ being longer than the plan line B X, because of the jambs being square to the line B′ C′ in plan instead of radiating to the centre O, as in the arch where splayed jambs are shown, and the joints also will be square to the line B′ C′ in plan as shown, this causing the bed molds to be different in shape to those previously shown.

The dotted lines L M L in elevation show the square section of the arch, and the soffit lines B M B′ show the developments of the inside and outside the arch.

To work the stone, No. 2, the molds required are shown in Fig. 9, where the bed mold is a different shape to the bed mold shown for the previous arch; but, nevertheless, the stone is worked and the molds applied in just the same manner.

In Fig. 9 H shows the bed mold, I the inside face mold, and K the outside face mold.

A six-storey reinforced concrete building in Boston, for the use of a motor car company, has circular columns of the same diameter as the upper and lower stories and has a long span floor construction permitting a deep turntable well of large diameter in each storey. The exterior faces of the walls, says The Scientific American, are relieved by panels and moldings integral with the body of the wall. The front wall corresponds with the brick and stone face of an adjacent building and has a rather elaborate trimming of concrete, dentals, and carved stone, all of which, except the last, are cast integral with the body of the wall.

New Method of Bonding Layers of Concrete

The problem of securing a perfect and durable bond between successive layers of concrete, is one of which every cement worker realizes the importance, says the Cement World. Special interest therefore attaches to the reported development of a new method of accomplishing this desired object. It is the discovery of Mr. J. A. Jamieson, of Montreal, Que., and is said to have been employed with highly satisfactory results in a variety of work, including the construction of a reinforced concrete elevator and a reinforced concrete conduit 10½ feet in diameter and 8,000 feet long, working under 33 feet head.

The surface of the concrete, approximately horizontal, is allowed to stand until water which may have flushed to the top has disappeared. When this result is attained, and while the mass is still moist, the entire surface is covered with a 1 to 1 dry mixture of cement and sand, to a thickness of about ½ inch. If necessary, this is protected with tarpaulins or boards. The moisture on the fresh concrete produces a partial set in the dry mixture. This is true of the particles in direct contact with the green concrete, the effect diminishing rapidly and the upper portion of the dry mixture remaining unaffected. The next layer of concrete is applied without removing the dry layer, the moisture in the fresh concrete completing the set through the half-inch dry layer, and producing a decided bond of the two courses. Briquettes made of cement mortar in two parts and joined by this method, developed a strength more than half as great as others made of the same material in a single piece. This would seem to be quite a satisfactory test.

Concrete Roof Trusses

A novel and interesting form of roof construction in reinforced concrete has just been completed in a London public bathhouse at Hammersmith.

The arched ribs shown in the section were taken as standing independently and were spaced 12 feet apart. The weight of the galleries was taken into consideration, but no allowance was made for them as stiffeners. Taking the arch ribs and purlins at 1 1-3 cwt. per cubic foot and the roof covering at 1-6 cwt. per square foot, the weight of half the arch was found to be equivalent to a vertical pressure of 18.9 T and a horizontal thrust of 14.2 T. The concrete was composed of gravel, sand and cement in the proportions of 4:2:1. The Kahn system of reinforcement was used throughout. The general type of construction is sufficiently indicated by the illustration, for which we are indebted to The Builder.

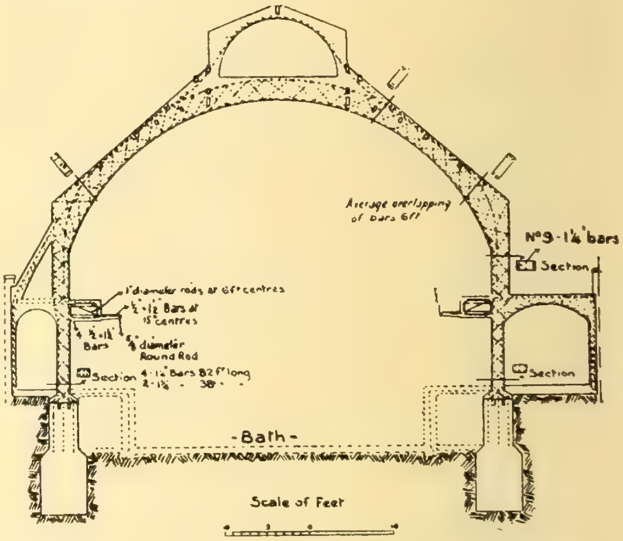


Diagram Illustrating details of Reinforced Concrete Roof Trusses

The entire plaster mill plant of the Albert Manufacturing Company, Hillsborough, N.B., was destroyed by fire recently at a probable loss of from $125,000 to $150,000. The company, with commendable enterprise, has decided to rebuild on a large scale and the manager, Mr. Osman, is now in New York making the necessary arrangements with the other directors of the company. The site is now being cleared and building operations will proceed at once. During recent years this company has made rapid progress by reason of its enterprising and business-like methods, and the temporary break in the continuity of its success will in nowise affect the ultimate destiny of the industry.

Six years ago the J. I. Case Threshing Machine Company put on the market their power steered 10-ton steam road roller—the only one of its kind on the market. The intervening time has witnessed many developments in their various lines of manufacture. This year they are turning out an excellent line for road building. In addition to the road roller and road sprinkling wagons they are now featuring Perfection graders and drags, rock crushers, rotary stone screens, rooters, road scrapers, railroad and township plows, Troy reversible bottom dump wagons, Case municipal tractors, and Case contractors' hauling engines.

Long-Span Concrete Beams

A large reinforced concrete building, having a number of unusual features, has been built in Manchester, England, for the Young Men's Christian Association. "The Builder," of London, from which these notes are taken, states that the building is 97 x 108 feet in plan and that it consists of practically seven floors and two basements. The building is about 75 feet high from street level to the main roof and about 100 feet high above the lowest basement floor. The most unusual features are the swimming pool between the fourth and fifth floors and the details of the main auditorium and the gymnasium. The main auditorium is about 26 feet in clear height, 52 feet wide and 84 feet long, entirely free of columns, the gallery, of a maximum width of 11 feet 9 inches, being cantilevered out from the columns along the walls. The fourth storey, immediately above the auditorium, is occupied by class rooms, and since there are no columns in the auditorium the floor is carried by three beams of 50 feet span, which also carry the gymnasium floor immediately above. The loads made it necessary that these beams be very deep and they were consequently formed in the walls between classrooms and were pierced at the centre by a doorway for the corridor. The beams are 12 in. wide and 12 ft. deep. The gymnasium is 52 ft. wide and 92 ft. long, and like the auditorium, is free of columns. Immediately above it are two fives courts, the walls of which are used as girders for carrying the floor of the courts, that is, the floor above the gymnasium, and the running track, which is carried by rods, encased in concrete, at the outer edge and by the walls on the other side. These walls, acting as beams, are 53 ft. 10½ in. long, 15 ft. 5 in. deep and 14 in. wide. The front of the running track gallery forms a continuous beam between the hangers. The swimming tank, 21 ft. wide and 60 ft. long, is between the fourth and fifth floors, with its bottom 50 ft. above the street level. It is constructed entirely of concrete and is carried by seven transverse beams of 26 ft. clear span. The architects were Messrs. Woodhouse, Corbett & Dean, of Manchester, and the structural engineers, the Trussed Concrete Steel Company, Limited, of Westminster.

Floor Beams in Mill Construction

"The method of connecting the floor beams to the walls and each other is of the utmost importance (in mill construction), and it is in the method of doing this that most designers fail," says F. W. Dean, of Boston, in a recent paper. "A floor beam should form a continuous tie from wall to wall in order to be effective. It should not be strained while it is being put up, or afterwards, until some disturbing event occurs to bring it into action as a tie. The method of securing it to the wall should be such that neither the brickwork nor the beam fastenings shall be strained until the disturbing event occurs. Into the brickwork there should be built a cast iron plate with side ribs, or, better still, a cast iron beam box, to take the end of the beam. There should be nothing cast on this plate or box to enter slots or holes in the beam, as is often done. The plate, or bottom of the box, should project into the mill far enough to receive a lag screw, and this should be the means of securing the beam to the plate or box, for reasons that will appear.

"Where the beams butt against each other over the columns they should be fastened to each other by two forged steel dogs, with inclined ends driven into holes on top of the beams and not on the sides. The beams are thus drawn together and are virtually one piece. After this is done the lag screws in the wall plates or beam boxes can be put in, thus making a rigid tie across the building without straining any part, splitting the ends of the beams, or pulling the bricks apart. By this method of connecting the beams to the walls, when the dogs are driven, if the beams move they can slide on the wall plates. After the beams are dogged together, lag screws should be put through the column caps, thus holding the column in place, and try tying the beams together on the underside. Grooves are made on the top of the beams for allowing the dogs to be depressed so that the planks can be laid over them. By placing the dogs on top of the beams they are invisible and cannot come out."

Impermeability Tests of Concrete

In order to discover some method of waterproofing which would produce impermeability in mortar and concrete only 4 in. thick when subjected to a head of water of 100 ft., and which would not be prohibitive in cost, a series of tests was made at the Engineering Experiment Station of the Iowa State College, Ames, Ia., by Mr. W. A. Burton. The speciments were in the form of pipes, 18 in. long, 6 in. in inside diameter and 4 in. thick. The concrete was mixed in proportion of 1:2:3½, though there were a few specimens mixed 1:3:5. Atlas Portland cement, fairly well graded sand with 35 per cent. voids, gravel retained on a No. 8 sieve and running up to 1½ in. in diameter, and crusher-run stone passing a 2½-in. screen were used. The mix was moderately wet, so that it would quake with a little agitation. The waterproofing materials were clay, alum and soft soap, and reground cement. A few wires were imbedded for reinforcing. The pipes were tested between bulkheads of 2½ x 16 x 16-in. plates held against the ends by eight 1-in. bolts. A ¼-in. rubber gasket was placed between the plate and the pipe.

In the first set of tests, made with pipe 60 days old, the measurement of water passing in 20 minutes at the end of three hours was chosen as the standard. At the end of this time the pipe would in most cases have reached its maximum leakage. In some of the best pipes it appeared later that maximum leakage may not come for a couple of days, but still there was not much leakage after 24 hours. In the second set of tests it was first intended to find a pressure for each kind of pipe at which there would be no leakage after 24 hours, but this was found to involve so many guesses that instead it was decided to test at the age of 90 days under the same condition as in the first test, except that the measurement was made at the end of 24 hours instead of 3 hours. All of the best pipes tested as well or better in the 90 than in the 60-day test.

The following summary gives the conclusions reached by Mr. Burton: All of the tests showed that broken stone is much better for impermeability than gravel. The effect of clay, which had been prepared by grinding until 98 per cent. passed a No. 200 sieve, was rather disappointing. When the cement was replaced by 10 per cent. of clay the leakage was decidedly cut down as compared with specimens having only 5 per cent. of clay. One specimen containing no waterproofing showed practically no leakage. The soap and alum waterproofing gave very satisfactory results, the pipe tested when 90 days showing practically no leakage at the end of 24 hours. This specimen was afterwards kept under a 45-lb pressure for 12 days. The maximum leakage, 10 drops per minute, occurred on third, fourth and fifth days. It then decreased to one drop per minute. The pipes made with reground cement showed less leakage than any of the rest, the leakage being practically nil under a pressure of 50 lb. per square inch. Tensile tests indicated that soap and alum do not materially affect the strength, and that reground cement increases it, the strength of these briquettes being about 25 per cent. in excess of those made with ordinary cement.

Correspondence and Current Topics

"Dr. Peter Gillespie, Dean"—Cement Interests and the Exhibition Authorities—The Engineer as Sole Arbitrator: Suggested Alternatives

Editor, Contract Record:

I desire to call your attention to a pamphlet being distributed in Canada by the Hercules Waterproof Cement Company of Buffalo and New York, which gives a summary of tests made by me last summer on some of their Hercules [illegible] and Waterproofing Compound.

In the first place, I am incorrectly described therein as "Dr. Peter Gillespie, Dean, Department of Civil Engineering in the University of Toronto."

In the second place, in justice to the public and myself, I wish to state that certain parts of my report have been omitted, and that in consequence, the impression obtained by the reader of the summary of tests in the pamphlet is quite different from what the public would receive from reading the report I submitted to the company.

I have notified the Hercules Company that I object to the summary of the report as set out in the pamphlet, and I have requested them to discontinue its publication. The Ontario Lime Association, the agents of the Hercules Compounds in Canada, inform me that they are in no way responsible for the contents of the pamphlet.

Very truly yours,
Peter Gillespie,
Lecturer in Applied Mechanics,
University of Toronto.

Cement Interests and the C. N. E.

Editor, Contract Record:

We believe that cement users are too busy during the Canadian National Exhibition to attend a Cement Show and take full interest therein. The machinery exhibited at such a season would lack the improvements and perfections it would naturally have if the makers had the benefit of the slacker winter season to work out their schemes of improvement after their former product had been subjected to a season's test and the imperfections had been brought to light. Without improvements in the machinery line the exhibit would cease to attract cement users.

Yours truly,
"Concrete Workers."

Concrete Industry Deserving of Better Recognition

Editor, Contract Record:

We have read Mr. Snaith's letter in a recent issue of your journal, and are inclined to agree with him. It is a fact that the cement shows both in the United States and Canada have always been held in the winter months. As these exhibitions are held for the benefit of concrete men and as it is generally very difficult, if not impossible, to place concrete work in freezing weather, the winter time seems to be the most appropriate to hold these exhibitions. The contractors generally are not busy and have ample time to attend the exhibition and convention. Coming as they do just before the opening of the building season these shows afford the opportunity for contractors to select additional equipment for their season's work.

The only advantage of holding this exhibition in conjunction with the Toronto Fair is that the general public attend the Canadian National Exhibition in great numbers, and with a large number of people it is their annual holiday. Furthermore, the Toronto Exhibition generally gets a greatly reduced rate on the railroads.

I doubt very much whether we could interest the Toronto Exhibition Board to the extent of getting a building for concrete exhibits. For years these people have refused to recognize the exhibitors of concrete machinery and have treated them very badly, setting aside no permanent space where this type of machinery can be exhibited. Every year we have found ourselves moved to a different location, and the exhibits are split up and spread at different points on the grounds.

We believe that the concrete industry should receive some recognition by the Toronto Exhibition Board, and a permanent space should be allotted to exhibitors of concrete machinery and products, so that the public who are interested in this wonderful building material will know where to find these exhibits. It is to be hoped that the Canadian Cement and Concrete Association will appoint a delegation to take up this matter with the Toronto Exhibition Board before the next annual fair.

In our opinion we hardly think a cement show can be pulled off successfully in conjunction with the Toronto Exhibition.

Yours truly,
Ideal Concrete Machinery Company, Limited.

Engineer as Sole Arbitrator

Westmount, April 4th, 1911.

Editor, Contract Record:

The leader on the above subject in your issue of the 29th ultimo is one deserving the attention of all engineers, municipal and otherwise.

The position of engineer as sole arbitrator on his own work is, to say the least, dangerous. While the engineer is in the best position to interpret his own specification, there often comes a breaking point between contractor and engineer when litigation or arbitration is forced upon the parties.

A point that is often lost sight of is that a specification is drawn up for the convenience of all parties to the contract. That being so, the engineer is in no position to be sole arbitrator.

The writer holds no brief for contractors but has only a desire to see engineers protect themselves and at the same time protect their employers.

Three methods of settling disputes suggest themselves:

1. Both parties to resort to the law courts. Without throwing any reflection on our legal brethren, this method cannot be regarded as satisfactory. It is costly and long, and very often incorrect.

2. In Great Britain, a practice often adopted is that the engineer names another member of the profession as sole arbitrator and the contractor agrees to this before signing the contract.

3. In South Africa, the writer found the following method to be satisfactory:

A list of names of engineers was printed in the specification and the contractor, before signing his contract, had to name one of these engineers as the sole arbitrator. This may seem to anticipate difficulties but in my opinion not more so than when an engineer names himself sole arbitrator.

Yours truly,

Arch. Currie.

Styles of Woodwork

Editor, Contract Record:

Wishing advice on the purchasing of some literature dealing with woodwork, and in particular with the various "styles" or "periods," I have been recommended to appeal to you. A short explanation will enable you to see my difficulty more clearly. I am a ship's hull draughtsman (steel work). The firm I am with found it necessary to send me over to the joiners' shop to lift the bevels of the doors, windows, etc. However, I find that I have also to get out full size details, and as these are in different "styles" I am somewhat put out. For instance, the dining room is to be Colonial style, the smoking room Flemish, I think, something else, "Adams," and another "Queen Anne."

Can you recommend me any book which treats with these various "styles?" As a draughtsman I prefer a book giving sketches rather than photographs.

Yours sincerely,

Draughtsman.

Read "A History of Architecture," by Prof. Banister Fletcher, page 578—The "Queen Anne," "Georgian," "Pediment and Portico" or "Eighteenth Century" style.

Books of Reference

Adam, R. & J.—Works in Architecture; 3 vols., folio 1773-1822.

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Belcher, J. and M. E. Macartney—Later Renaissance Architecture in England—2 vols., folio 1897-1901.

Blomfield (R.)—A History of Renaissance Architecture in England, 2 vols.

Gibbs, (J.)—Book of Architecture—Folio 1728.

Papworth (W.)—Renaissance and Italian Styles of Architecture in Great Britain.

The Georgian Period—A set of portfolios containing measured drawings of Colonial work—Published by American Architect and Building News.

Corner & Soderholtz—Books of Photographic Reproductions—"Colonial Architecture of New England."

Chandler—Colonial Architecture of Maryland, Pennsylvania and Virginia.

Ewerbeck—Flemish Renaissance (Die Renaissance in Belgium and Holland. Vols. I., II.)

The Importance of Bent Glass in Architecture

It is nearly a hundred years since architects sought for glass to be made to given curves, and while the art of bending glass has been practised to a limited extent for upwarde of seventy-five years in the district known as "Glass House Fields," London, England, the extensive use of it by architects for building is of much more recent date. Especially of late, in London, Paris, Brussels and other continental cities its use has become extensive for show windows.

It has become the practice to brilliantly illuminate the streets at night, which (in moderate weather), are acceptable promenades. Store or shopkeepers advertise their wares after closing hours by a well-lighted window, and this is made more effective when the public can go under the shelter of the main buildings. Many of the finest shop fronts are so constructed as to admit of this. Some recede from the street line for a considerable distance, almost producing an arcade effect, while others are so arranged as to form a rotunda. These, where frontage admits, have spacious, imposing vestibules which are dressed at night in some ready way like an ordinary window. The effect of these display windows is very beautiful, some having their ceilings adorned with mirrors in bold geometrical design interspersed with electric illuminating lamps.

Excellence, utility, and even a charm are secured by using bent plate glass for shop fronts, not obtained by straight lines. Glass, like sheet metal, has imparted to it a stiffness when bent, so that where the superstructure admits of it, bent panes of glass may be joined together, in a continuous line, by very light bars. In fact, where conditions are favorable, bars may be dispensed with, the two edges of the panes being merely butted together.

Where bent glass is used, the design should have a bold treatment with the curves to as large a radius as possible. These curves produce the best effect besides being the cheapest. A section of an ellipse is equally as effective as a segment of a circle, such plates being bent over their entire surfaces, however slight it may be. The original richness of plate glass is not only preserved, but is enhanced by the charms of its curvature. Canadian architects have not had the advantage which bent glass affords until quite recently, owing to its having to be imported from Europe. After waiting months for bent glass, it often happened that it would be broken in transit. Bent plates of very large dimensions are now easily obtained from Canadian glass benders, thus enabling our architects to produce as fine a class of store fronts as any of the continental creations.

Labor Matters at Montreal

The Master Carpenters and Joiners' Association of the Montreal Builders' Exchange has voluntarily granted an increase to carpenters in that city for the coming season. The amount is not stated but the increase will go into effect on July 1st and the masters reserve the right to pay the higher rates to deserving workmen entirely at discretion. The present average pay for journeymen carpenters is 30 cents an hour.

No serious labor trouble is anticipated in the building industry for the coming season, it being expected that the carpenters will accept the offers of the association. The brick and stone masons last September signed an agreement with the exchange on the conclusion of the strike in those trades, the agreement being binding for two years hence. Plasterers and painters have been demanding increases, the former asking for an eight-hour day with a minimum rate of 45 cents an hour from the middle of June. The employers have offered to meet the men more than half-way by proposing a minimum rate of 42½ cents for a nine-hour day to the end of October, and eight-hour day from the first of November, and the full rate of 45 cents from the first of January, 1912. The proposal is still under consideration by the operative plasterers. Master builders state that it would be a great inconvenience to have one trade working only eight hours while the others work nine, and that when the eight-hour day does come, it would be better to make it general.

In the case of the painters, the masters refuse to accede to demands for a minimum rate of thirty cents an hour, stating that present conditions do not warrant it, and have decided to run "open shop," with a graded scale of pay according to ability. The open shop principle will also be maintained in the electrical and plumbing trades for the current year.

The progressive city of Saskatoon, Sask., has a hospital scheme involving an expenditure of [illegible]. Mr. Meyer J. Sturm, of Chicago, is the architect.

Toronto carpenters are endeavoring to get a minimum wage of 40 cents an hour. The proposition has virtually been declined by the employers. Negotiations are still in progress.

New Town Engineer of St. Lambert, Que.

Mr. A. S. Dickison, who has just been appointed town engineer of St. Lambert, Que., was born in New Brunswick at Fredericton, where he graduated as a civil engineer, after which he took a post-graduate course at Cornell. His first professional engagement was in railway construction work. He next became city engineer at Westbrook, Maine. Following this he was appointed superintendent of an extensive steel works, now a branch of the United States Steel Company. On the completion of this engagement he opened an office of his own and did considerable work for the United States Government as a consulting engineer and inspector of warships. Just before returning to Canada a year ago, Mr. Dickison installed a 250-ton refrigerator plant at Baltimore, Maryland, and a 70-ton plant near Philadelphia;
by

Mr. Dickison is an expert in industrial plants, having been engaged for fifteen years in their construction and operation, and he is a specialist in refrigeration, the operation of gas engines and the manufacture of abrasives, his experience in these special lines in the United States having been very extensive. He is at present engaged on the equipment of an "abrasives" plant for the John Cowan Company, Limited, of Montreal.

M. A. S. Dickison, Town Engineer of St. Lambert, Que.

Mr. Dickison has already entered upon his new duties under the council of the town of St. Lambert, where the citizens recently voted in favor of a loan of $225,000, to be spent on improvements such as sewers, permanent sidewalks and street paving.

Personal News and Notes

Calgary has excellent prospects for a good building season. There is little danger of a disagreement between the unions and the Builders' Exchange.

A big building year is opening up at Edmonton, Alta. Two million dollars' worth of work will be commenced within the next month. No labor troubles are in sight.

Mr. J. S. Irvin has just returned to Ottawa after a three months' stay at Spokane, Wash., where he organized and was elected president of a new cement company.

Estimates for a cement plant to cost $750,000 that will provide a mill with a 2,000 barrel capacity, and a payroll of three to four thousand dollars a week, are being prepared by Allan Haines, F. J. Klossosk and R. D. Hassan, experts employed by the million-dollar Edmonton syndicate that will develop the marl beds fifteen miles west of Edson on the Grand Trunk Pacific.

A meeting of the American Institute of Electrical Engineers was held at the University of Toronto on April 7. A dinner was afterwards served at the Engineers' Club, 92 King street west, Toronto.

The St. Lawrence Bridge Company, of Montreal, have secured the contract for the Quebec bridge at $8,650,000. A cheque representing 15 per cent. of the contract price has been deposited by the firm.

David Seath, the Secretary of the Montreal Harbor Commissioners, invites applications until April 10 for the following vacancies: general foreman, crib construction foreman, assistant superintendent for the dredging fleet, cost clerk and checker.

The annual banquet of the Edmonton Builders' Exchange was held at the Yale Hotel, Edmonton, on April 3rd. The president, Mr. R. J. Manson, presided. Elaborate arrangements had been made and the event was a most successful one. A number of guests were present from the other provincial exchanges.

April 1st was the appropriate day chosen by 200 employees of the building trades at Lethbridge to go out on strike as a protest against open shop, which has been declared by the local exchange. The strike was only of one day's duration and is stated to have been instituted solely as a protest.

Mr. C. H. Topp has almost completed his survey of Sooke Lake and has submitted an interesting report to the Victoria council. This report has been turned over to the water commissioner and the city engineer, who will make their recommendations to the incoming council. It will be remembered that Mr. Topp's appointment on this work was vetoed by the mayor, but so far without effect, since the engineer had received official notification to proceed with the work.

The Winnipeg Builders' Exchange is again embroiled with the bricklayers' union of that city, which claims that last May an agreement was reached whereby the men were to receive 67½ cents an hour for an eight-hour day after January 1st, 1911. The rate is now 62½ cents for a nine-hour day. The Exchange very rightly contends that the union violated its part of the agreement last year at the time of the dispute with the Lyall-Mitchell Company. The men have decided to leave the decision with the executive at Indianapolis.

Asphalt Mastic Floors are described and illustrated in an interesting booklet which we have received from the American Asphaltum Rubber Company. These floors are claimed to be absolutely waterproof, acidproof and sanitary. They are given with a five-year guarantee and are sold with the approval of the United States government inspectors Among the many large firms for which the company has completed contracts may be mentioned the International Harvester Company, Chicago, and Swift & Company, Chicago. Estimates and full particulars will be furnished on request.

We have received from the Canada Foundry Company a catalogue of the Cochrane open feed water heaters and the Cochrane heaters and receivers, manufactured by the Harrison Safety Boiler Works, Philadelphia, Pa. The Cochrane heater utilizes the exhaust steam from engines, pumps or turbines to heat water for boiler feeding or other purposes. It is claimed that it does the work of sixteen per cent. of the boiler room equipment and that it effects a saving of one-sixth of the total expense.

Sawmill and Block Cutting Plant of the Dominion Carbolineum Works, Ltd., Vancouver

Creosoted Wood Blocks in Highway Work

Selected upon Merit, and after Exhaustive Tests, by Leading Cities of the World — Description of Modern Plant at Vancouver

Well-kept highways have from time immemorial been an evidence of civilization, culture and the desire to trade. Savage races who were content with mere trails have passed without leaving a tangible mark whereby historians might record their coming and going, but the road-builders made history. When the Romans set out upon their career of world-subjugation their first care was to connect up the conquered states by means of an Imperial highway, the excellence of which established a model to be copied by modern builders and become the starting point of the magnificent highways which are to-day the boast of England and France. The Azteas of Mexico were builders of good roads, and it is cause for regret that the fact facilitated their destruction by providing Cortez and his adventurous band with the facilities for a successful invasion of their capital city.

In Canada the construction of good roads is being prosecuted with vigor and a regard for fundamental principles. Cities and towns are laying down countless miles of pavement, and villages and country municipalities are promoting trade by co-operating in the construction of macadamized leading roads. As might be expected from the push and enterprise animating its people, Western Canada is well to the fore in the good work, and even in this com-

30,000 Yards of Paving Blocks Piled for Seasoning

The Retorts, Showing also Loaded Cages

Water Shipping Facilities Dock and Derrick.

Railroad Shipping Facilities —Loading Cars with Paving Blocks.

paratively undeveloped province of British Columbia the problem of better roads is being given earnest attention everywhere, with the result that vast sums are being expended on the construction of modern pavements and roadways of the best type. The provincial government is aiding in the good work by building a splendid highway from the coast through the mountains to the border of Alberta, where connection will be made with a system planned by the governments of the prairie provinces, by means of which it will be possible a few years or so hence for tourists to drive their automobiles or carriages in comfort and safety from Winnipeg to Vancouver, and thence by ferry to Nanaimo or Victoria, where connections can be made with the magnificent highways being built on Vancouver Island for sight-seeing purposes.

So much for the trend of the times and roads in general. However, it is with a material used in the construction of the highest class of pavements that we have to deal in the scope of this article. We refer to creosoted wood blocks, which are now being endorsed by the cities of Chicago, New York, London and Paris, for heavy traffic streets, after exhaustive tests of all other kinds of paving. The merits of creosoted blocks have been recognized and admitted for years, and recent improvements in the method of laying have greatly aided their popularity.

Modern Creosoted Block Plant

The plant of the Dominion Carbolineum Works, Limited, was established on Coal Harbor, Vancouver, some ten years ago by Mr. W. H. Harvey, the present energetic head of the company. Mr. Harvey had studied the chemistry of woods in the east for some years, and realizing the opportunity awaiting him in the development of the city and province, he lost no time in investing his money in an up-to-date wood block plant—the only one of its kind in Western Canada. The business grew and prospered to such an extent that the Coal Harbor site became too small for its needs and in the fall of 1908 the company acquired their present site of 21

The Great Bridges at Vancouver, paved with the product of the Dominion Carbolineum Works, Ltd.

acres in South Vancouver. The property fronts on the North Arm of the Fraser River, and is skirted by the Vancouver-Eburne-New Westminster line of the British Columbia Electric Railway Company. Work was at once commenced on the new buildings, the erection of which was completed in August of last year, when the old site was abandoned. The new plant was designed to be, and undoubtedly is, the finest of its kind in the Dominion, the capacity being more than treble that of the Coal Harbor plant.

The sawmill is 250 x 44 feet in size, with a block mill wing 90 x 38 feet. The building is of massive construction, iron covered, and rests on piles driven to hardpan. The mill is operated exclusively for the production of material for the making of wood blocks. The fir log when taken from the water enters at the south end of the mill, where saws remove the slabs and sappy timber, the choice planks passing on to other saws which cut them into three and four inch cants. These pass through a huge planer which dresses all four surfaces at one operation to exact dimensions, after which the cants pass to two sets of block gang saws in the block mill, having a capacity of 50,000 blocks per day of nine hours. At these saws (which operate back and forth on a sliding arbor, making 25 cuts to the minute, and four blocks per cut), the blocks are subjected to three cullings for imperfections, such as large or loose knots, gum, and ring-shake. The selected blocks are then packed into steel lattice work cages or cars, each holding about 80 square yards of blocks. When filled the cages are run over a narrow-guage track to the creosoting cylinders, about 50 yards distant, which hold eight and twelve cages respectively. These cylinders are 65 and 100 feet in length, the diameter of each being 7 ft. 6 in., they are built of three-quarter inch boiler plate. The massive steel castings forming the doors of these huge retorts were the first jobs turned out at the new steel foundry of the Vancouver Engineering Works, where the retorts and cages were also constructed. When one of the retorts has been filled with laden cages the heavy doors at either end are slid into place and secured with numerous heavy bolts which lock the edges hermetically. Creosote is then allowed to run into the retort from a 30,000 gallon circular steel reservoir above until the contents are completely submerged, when live steam is turned into the many coils inside the retort, and the process of boiling the sap out of the timber begins. The blocks are allowed to remain in the retort until the exhaust guage shows that all the sap has been completely eliminated, which usually occurs in about fourteen hours. At this stage in the process of "cooking" oil pressure is applied in order to fill the pores of the wood with the hot creosote, the pressure being kept up until the specified amount of creosote has been absorbed. The required pressure is secured by using a very powerful triplex pump to force more creosote into the already full cylinder. If the natural wood juices have been thoroughly removed the timber under the great pressure applied will immediately start to absorb this additional creosote, it being some time after the starting of the oil pump before the pressure guage records any considerable increase in pressure. On the completion of the process the oil reservoir in the retort is then elevated by compressed air into the reservoir from which it was released, the doors are removed, and the cages containing the treated blocks are run out to the piling ground, where the blocks are carefully piled, covered, and permitted to remain until well seasoned. The larger of the two retorts is principally used for the treatment of long bridge timbers and piles. It is the intention of the management to install another large retort in the near future, the many orders for creosoted timbers and piles already justifying this further expansion.

The blocks are manufactured from logs of selected Douglas fir of medium growth, only live green logs being used. This practice of using green and unseasoned timber is contrary to general usage in the manufacture of wood blocks in the United States, but president Harvey has learned through his close study of the business that when Douglas fir has become even partially seasoned the wood juices are coagulated into a hard gum which necessitates very severe treatment to dissolve and replace with the crosote. Severe heat and pressure in creosoting weakens the timber along the laminations and injures very materially the tensile strength. The object in view in using the green timber is the injection of the oil into the tissues in as gentle a manner as possible in order that the timber may be thoroughly impregnated and yet retain its original strength.

When the company first commenced the manufacture of wood blocks for paving the timber for the blocks was purchased from local mills. It was speedily discovered, however, that owing to the best part of the logs being used for other purposes, the plank received from the mills were of very indifferent quality and naturally produced blocks very inferior to the standard desired. This it was that prompted the company to undertake the large outlay necessary to establish their own sawmill, but they have the satisfaction of knowing that only one or two similar concerns on the American continent are as well equipped.

Steam and Compressor House

The manufacturing end is operated altogether by electric power, a radical departure now marking the operation of the more modern sawmill plants on the coast. Individual motors are used for groups of machines, so that one part of the mill may be instantly closed down for adjustment or repairs while the other units are still operating. Four motors are in use, two of 200 h.p., one of 30 h.p., and one of 25 h.p., while a direct-connected 75 h.p. turbine pump of 750 gallons per minute capacity is being installed solely for fire protection purposes. Belting and transfer chains are driven from the basement floor, and in other ways the desire of the management to secure up-to-date conditions is quite apparent.

The narrow [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] so arranged that shipments may be made by rail or water with equal facility. The retort, which opens at both ends, permits the treated and untreated charges to be handled as desired. The dock is equipped with a five-ton steam derrick to handle piles and bridge timbers, and load by water or scows.

The entire plant is thoroughly protected by a complete system of hydrants and [illegible] supplied with ample hose. The pump house on the waterfront is continually [illegible]

[illegible] one man day and night. Water pressure may be given instantaneously by turning on the electric turbine pump, thus assuring almost perfect protection from fire.

Some Interesting Details

The sawmill, creosoting cylinders and reservoirs, power house, tracks and platforms, men's dwellings and docks, are built on cedar piling driven to bed rock, thus assuring solidity and permanence.

Steam for heating the retorts is supplied from a 100 h.p. boiler installed in a brick and iron power house adjacent to the cylinders. Sawdust and shavings from the mill are used for fuel, being delivered to the furnace by an excellent blowpipe system installed by John R. Tacey, the Vanocuver expert in that line. The installation works so perfectly that all refuse is removed from the machines, the floors appearing at all times as if recently swept. The boiler also operates the air compressor used for elevating the creosote from the retorts to the overhead reservoir.

The creosote is secured in Glasgow and Liverpool, coming via Blue Funnel steamers around the Horn. It is shipped in steel drums containing 90 Imperial gallons. The usual shipment numbers 1,000 drums, or sufficient to fill one hold of the vessel. The last consignment arrived a few weeks ago per s.s. Oanfu.

About seventy men are employed constantly in and about the plant. Substantial and well equipped bunk-houses have been provided, each man having his own little sleeping compartment. Partitions do not run to the top, thus permitting a free circulation of fresh air admitted by ventilators. The dining hall is presided over by a capable chef, the bill of fare being superior to that found in many city restaurants.

The company is planning the erection of a new office building, the present structure being required for a general store and post office. The ten acres of the site at present in bush will also be cleaned up and improved along the water frontage of 1,350 feet.

Mr. W. H. Harvey is president and general manager of the company, and his son, Mr. W. W. Harvey, is secretary-treasurer.

The Market for the Product

The company has met with great success in securing a market for their blocks in Vancouver, practically all of the business district and many of the residential streets being paved with Dominion wood blocks. The mileage at present in use will be largely increased in the near future by the additional work authorized for this year. The first piece of paving supplied by the company has been down some ten years, and is still in splendid condition despite the constantly heavy traffic. This fact, together with the reliable character of all their work, is responsible for the many large contracts placed with the company during the last few years, and which led to the extension of their plant. It is significant that the Canadian Pacific Railway Company has lately adopted Dominion wood blocks for paving the long platforms at all divisional points throughout the mountains and prairies. The company are now filling a large order for creosoted timbers and paving for the two new bridges being constructed at Winnipeg.

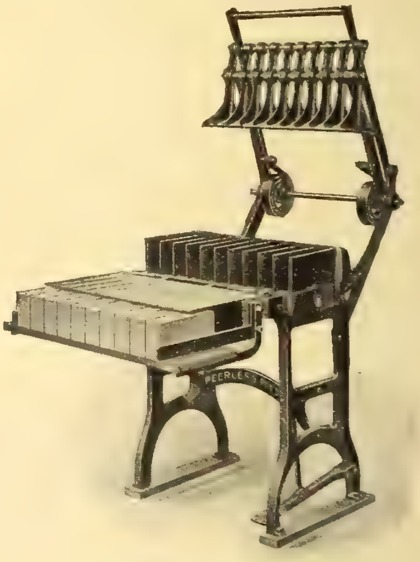
One Man Power

A few years ago people spoke of the "Seven Wonders of the World," but in this day there are such a diversified number of wonders that the original seven seem very small indeed.

Even ten years ago, had anyone said that one man could make five thousand pressed brick in one day by hand, he would have been labeled a fanatic on the spot; but ten years bring huge changes, for to-day the Peerless Company, of Minneapolis, Minn., are putting on the market a machine which is well called peerless. The claims they make for it are exceedingly strong, but so far as we know these claims have not been refuted. The Peerless machine will turn out as many brick, so it is claimed, as any $10,000 plant manufactured, and at the same time do this with one-third less men. That statement is strong. The Peerless is remarkable for its ease of operation. By referring to the cut here you will notice the tamping device, which is automatically lifted by two large coil springs that do away with a large percentage of the work. By referring to this drawing you will see that the tamp on the bricks must be absolutely accurate, making. Cement brick are more and more coming into public use, inasmuch as they are far superior to clay brick, and by the use of the Peerless, can be made much better and cheaper. Not only this, they are absolutely fireproof, and instead of deteriorating with age, they become harder and harder.

The Peerless machine is substantially made of iron and tool steel, and is strong, compact and durable. Its working parts are the very essence of simplicity, and with ordinary care it will last a life time.

One of the strongest features of the Peerless machine is its price, as one does not have to invest a small fortune in a machine, and another small fortune in getting a place to operate it. Their catalogue tells you all about it. It is an interesting catalogue, too, and it will interest every man who wishes to save money. A post card addressed to the Peerless Brick Machine Company, 92 Adelaide street west, Toronto, will bring this to you. Write for it.



The Peerless Brick Machine

To the Tiffin Wagon Company, Tiffin, Ohio, we are indebted for a copy of an interesting booklet containing a description of their various lines of municipal and contracting vehicles. The Tiffin Company have an unequalled assortment of dumping wagons, street cleaning and sanitary carts, and heavy trucks. Although they have only been in this department of the business for three years, they have effected during that time such improvements that their name is coming to be regarded as a standard in this line. Noteworthy among the latest products of the firm are their automatic street flushing machines, sprinklers and road oiling wagons. Municipalities and contractors will be well advised to secure the company's catalogues.

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Calgary, Alta.
On April 24th a by-law will be passed upon by the electorate to raise $66,000 for the purpose of improving, laying out, and beautifying the parks and boulevards. W. D. Spence, city clerk.

Camrose, Alta.
On April 21st a by-law will be submitted to authorize waterworks expenditure to the amount of $83,000.

Chilliwack, B.C.
T. F. Sinclair, of New Westminster, will be asked to make a thorough inspection of the ground, ascertain levels and estimate the cost to the city for a complete sewer system which is considered by the council.

Clinton, Ont.
The by-law to extend waterworks system at a cost of $5,000 has been approved.

Cornwall Centre, Ont.
Tenders addressed to John Mullin, Tp. Clerk, are called until May 1st for construction of Stoney Creek drain in the Tp. of Cornwall. Plans, etc., at office of the above or at the office of Magwood & Walker, Cornwall.

Esquimalt, B.C.
The residents of the district between the E. & N. railway tracks intend to establish a sewerage system estimated to cost about $125,000. A. R. Wolfenden, Jas. McAdam and T. B. Sedger are interested.

Galt, Ont.
Tenders addressed to Joseph McCartney, town clerk, will be received until April 17th for supply of Portland cement, lumber, hardware, castings, sand and gravel required for the season of 1911.

Harrow, Ont.
Tenders addressed to J. H. Madill, tp. clerk, will be received until May 1st for drainage work on Wellington and Maple avenue drains.

Kamloops, B.C.
The question of extension of waterworks is being considered, including a new reservoir and a larger main on Victoria and Main streets, and possibly a new power house.

Melville, Sask.
A vote will be taken on the following by-law on April 24: $63,000 for waterworks for a main storm water sewer.

Montreal, Que.
City Engineer Janin has recommended that the little river St. Pierre be covered by [illegible] $11,000.

Moose Jaw, Sask.
A $175,000 loan was authorized for sewer and water extensions, and $50,000 for an incinerator.

Oshawa, Ont.
The Board of Works received four tenders for the asphalt block paving as follows: Ontario Asphalt Block Company, of Windsor, $43,128; Secord & Sons, Brantford, $44,059; McGuire & Sons, Toronto, $44,587; Allen & Kingthorne, Toronto, $45,786.

Ottawa, Ont.
City Engineer Ker is making enquiries regarding street sprinklers, a new kind of oil for macadam roads, and also an oil for asphalt pavements.

Penticton, B.C.
Tenders are called by F. E. Tily, municipal clerk, for the construction of infiltration chambers, reservoir works, and excavation for and laying of pipes for waterworks system here; also for pipe, c.i. and specials; wrought iron, galvanized; hyrants, valves and other fittings; meters; steel pipe, lapwelded; and for excavation and laying of pipes and fittings and general construction. Tenders for materials must be in by May 15th; for construction by May 1st. F. H. Latimer, engineer for the municipality.

Regina, Sask.
Tenders are called until April 26th for c.i. pipe. L. A. Thornton, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders are called for sewage pumps and motor switchboard and apparatus for sewage disposal works until April 30. John Marshall, chief engineer, trunk sewer works. Advertisement in "Tenders and For Sale Department" of this issue.

Revelstoke, B.C.
The by-law granting $9,000 for purchasing road machinery for permanent roads was given approval by the ratepayers.

Ridgetown, Ont.
On April 25th the ratepayers will vote on a $35,000 by-law for installation system of waterworks. D. Cochrane, town clerk.

South River, Ont.
Bids wanted for laying about 3,000 square yards of cement sidewalks, council to supply all material; level sandy bottom. H. O. Boorse, clerk.

South Vancouver, B.C.
Councillor Burgess has broached the advisability of erecting a municipal rock crushing plant on the North Arm of the river, and there crushing the rock and distributing it to the roads as needed. Estimated expenditure on roads, $1,000,000.

Tofield, Alta.
The by-law to raise $8,000 for expenditure for the initial installation of a municipal water system was carried.

Toronto, Ont.
The City Engineer has recommended the construction of pavements and roadways involving an expenditure of over $97,000.

Tenders addressed to G. R. Geary, chairman, board of control, will be received until April 25th for supply of a priming equipment for centrifugal pumps at the Toronto Filtration Plant. Advertisement in "Tenders and For Sale Department" of this issue.

The following are the streets which are to be widened, with the respective costs: St. Clair avenue, $473,612; Danforth avenue, $301,000; Bloor street, $136,000; Anderson street, $113,925; Greenwoods avenue, $50,000; Vaughan road, $7,000; Chelsea avenue, $1,950; total, $1,084,087.

Welland, Ont.
On April 26th a by-law will be submitted to the people authorizing waterworks expenditure to the extent of $75,000. Former by-law $52,000, for waterworks is repealed. G. R. Boyd, clerk.

Winnipeg, Man.
The tenders of the Canada Iron Corporation of Montreal for 800 tons of water main pipes was recommended to council.

Tenders addressed to the board of control will be received until April 19th for supply f.o.b. city yards of one 10-ton and one 8-ton asphalt rollers. The rollers may be gasoline or steam driven; if the latter, boiler must be horizontal. M. Peterson, secretary.

AWARDED

Calgary, Alta.
The portable asphalt plant will be supplied by the Bitulithic Paving and Contracting Company. This plant has a capacity of from 800 to 1,000 yards a day. The rock crusher, which is guaranteed to crush 100 tons a day, will be taken from the W. H. Baxter Company for $2,506. A five-ton steam roller will be supplied by the Western Equipment and Supply Company for $2,248.50, delivered and duty paid. The dump wagons, required in connection with the work, will be supplied by Mussens Limited, at a cost of $1,155.

Fort William, Ont.
The following tendered for labor and certain material in laying water main: Culiton & McRae, $21,114 (accepted); Stewardson Bros., $22,850; A. Cameron & Sons, $32,810; I. Waki & Co., $28,500; City Engineer, $24,620 (all of Fort William).

Oshawa, Ont.
The contract for asphalt block pavement was awarded to Ontario Asphalt Block Company, Windsor, Ont., at $2.49 per square yard. F. Chappell, C.E., engineer in charge.

Port Arthur, Ont.
[illegible], 11 Cumberland street, were the successful contractors for supply of sewer pipe, $1,215; W. B. & [illegible], Pt. Arthur, secured the

[illegible] J. Antoni, [illegible] Arthur street, engineer in charge.

Souris, Man.

We are advised that M. S. Holmes, Portage la Prairie, was awarded the contract for the laying of sewers and water mains here. Tenders were received from [illegible] on the east and [illegible] on the west. Vernon H. Williams, engineer in charge, Souris.

St. Thomas, Ont.

The following selected on walks, curbs, etc., for current year: G. A. Ponsford, St. Thomas, cement walk (sand), 72 cents ft.; cement walk (granite), 15 cents ft.; curb, 25 cents ft.; curb and gutter, 45 cents ft.; curb with walk, 13½ cents ft. A. E. Ponsford, St. Thomas, cement walk (sand), 11½ cents ft.; cement walk (granite), 15 cents ft.; curb and gutter, 45 cents ft.; curb with walk, 13 cents ft.; curb, 26 cents ft. (Accepted). M. H. Baker, engineer.

Toronto, Ont.

The City Engineer was awarded the contracts for pavements on a dozen streets at the aggregate cost of $109,327. The Barber Asphalt Company was awarded the contract for paving Dingwall avenue at $3,267, which was $32 below the City Engineer's tender. The contracts for concrete sidewalks and curbs were secured in all but three cases by the City Engineer.

Railroads, Bridges and Wharves

Calgary, Alta.

The Grand Trunk Pacific plans of the entrance to the city were approved. The final route shows a crossing of the Elbow rvier a short distance above the C. P. R. track and the terminal station at the Barrack grounds.

The Canadian Northern Railway has decided not to cross the Elbow river at all, but to keep its station on the south side. The company owns 130 acres comprising the Lindsay estate and will establish its station and yards there.

Grosse Isle, Que.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until April 26th for construction of extension to the western wharf at the Quarantine Station here. Plans, etc., at above department; at the office of the district engineers at Quebec and Montreal.

Kingston, Ont.

H. B. R. Craig, C.E., city engineer, writes that the work on the new drawbridge for which tenders were called until April 5th, has been delayed for time being on account of certain negotiations between city and an industry which proposed to locate here, falling through. All companies asking for information were notified in time so as to prevent their doing too much work in the matter. It is expected that the drawbridge will be constructed at some time in the near future.

Newcastle, N.B.

Engineers MacVey and Mallory, of the Public Works Department, Fredericton, were here taking soundings for a new bridge on the Miramichi. The bridge will contain a draw, as provided for under the Dominion government regulations, and consequently there will be no interference with the passage of the lumber and ore steamers.

Ottawa, Ont.

The closing of part of the present canal, the opening of a new one on the western side of the city, and a tunnel from the central station to the Union station, are recommended by City Engineer Ker, and W. F. Tye, consulting engineer, Toronto, to the city council as the best solution to the problem of railway entrances into this city. The idea is to have a general entrance for all railways, including electric lines, into the city, along the present canal reserve from the "Deep cut."

This is very much the same plan as was proposed by Engineer Cauchon, for the C. P. R. several months ago, but the plan now recommended includes taking up the cross-city line of the Grand Trunk Railway, and bringing it from the Central station to the Union station in the same tunnel as the C. P. R. The tunnel will cost about $1,500,000.

Owen Sound, Ont.

Tenders for the new cement government wharf here will be called shortly and the work commenced early in May. The new wharf will extend 67 feet. J. G. Sing, government engineer.

Port Hope, Ont.

The council have asked for plans and specifications for the electric light bridge.

White's Cove, N.S.

Tenders are called by Public Works Department, Ottawa, until May 3rd for extension to Wharf at White's Cove, N.S. R. C. Desrochers, secretary.

AWARDED

Calgary, Alta.

Contracts on this division of the C. P. R. have been awarded as follows: Red Deer roundhouse, Dominion Equipment and Supply Company, Winnipeg; five standard No. 5 stations at Tompkins, Suffield, Burdett, Bow Island and Redcliffe, J. E. Lussier, Medicine Hat; six-stall engine house addition at Red Deer, Carter-Hall's Aldinger Company, Winnipeg; No. 1 bunkhouse, Red Deer and Calgary, G. M. Eaton, Strathcona; extension to Medicine Hat depot, brick and stone, G. E. Lussier, Medicine Hat.

Crediton, Ont.

The contract for concrete abutments and floor for bridge here was awarded to J. Lawson, Crediton, $1,960.

Kenora, Man.

The C. P. R. subway at north end of Main street is to be built immediately. The contract was let to C. G. Anderson, Winnipeg, and calls for the completion of the work by July 10. Geo. H. Archibald was also given a contract for several small bridges and culverts between Winnipeg and Brandon.

London, Ont.

Contracts for the construction of ten bridges, the first of a large number to be erected in the county as soon as the weather moderates, were awarded as follows: Bridge over Dingman's Creek on Wellington road, 40-foot span, Andrew Bain, $532; culvert over drain, Wellington road, 10-foot span, E. W. Kelly, $237; bridge over Dingman's Creek, between Dorchester and Westminster Townships, 16-foot span, Andrew Bain, $328; culvert over drain crossing line between Dorchester and Westminster townships,10-foot span, Andrew Bain, $140; bridge between concessions 4 and 5, London township, 45-ft. span, Freeman Talbot, $779; bridge between lots 8 and 9, concession 5, London township, 16-foot span, Freeman Talbot, $519; bridge, London township, 40-foot span, Freeman Talbot, $789; bridge over Doty's Creek, Nissouri West township, 40-foot span, Freeman Talbot, $659; bridge between concession 5 and 6, Nissouri West township, 18-foot span, Andrew Bain, $350; bridge between Delaware and Westminster townships, 20-foot span, Freeman Talbot, $599. The bridges are all of steel and concrete construction. Chas. Talbot county engineer.

Quebec, Que.

The contract for the Quebec bridge has been awarded to the St. Lawrence Bridge Company, an amalgamation of the Dominion Bridge Company of Montreal and the Canadian Bridge Company of Walkerville. The cost of the bridge, according to the estimate of the engineers on the company's figures for the various parts of the work, will be $8,650,000. The contractors for the structure agree to have the work completed by December 31, 1915. The first thing they are to do will be to purchase land and erect new shops, the whole to cost $1,000,000, as no existing plant in the Dominion is sufficient to carry on such an extensive contract. The shops will be in or near Montreal and not in the neighborhood of the bridge site, as has been reported. The contracts for the steel has already been given to the United Steel Company, of Pittsburg.

Public Buildings, Churches, Schools, etc.

Arcola, Sask.

The Provincial Government will at once erect a new Land Titles office here. Cost, $30,000.

Amherst, N.S.

Tenders are called until May 1st for erection of school house of brick with cement trimmings, etc. Leslie R. Fairn, architect, Aylesford; W. F. Donkin, town clerk. Advertisement in "Tenders and For Sale Department" of this issue.

We are informed that nine architects submitted competitive plans for the new public school here. Those of Leslie R. Fairn, Aylesford, N.S., were accepted. Eestimated cost. $40,000. W. F. Donkin, town clerk.

Barrie, Ont.

The Board of Education have decided to remodel the present Collegiate Institute as the cost of a new building is prohibitive. Further details awaiting the report of Stewart & Witton, architects, Hamilton.

Berlin, Ont.

The plans of E. H. Macklin, which indicate two 1-storey brick buildings at a cost of $2,200 each, were recommended for the new Isolation Hospital. Mayor Schmalz; Mr. Cairnes, chairman board of health.

Brandon, Man.

A committee, of which D. Shiriff is chairman, was appointed by school board to confer with the board of trade and council in regard to the securing of a Carnegie library.

Calgary, Alta.

The school board have purchased a site for a new 2-roomed school house in Parkview.

Architect L. Dowler has been instructed to call for tenders for the Bishop Pinkham College building, the plans having been approved. Rev. A. J. B. Dewdney, secretary.

Tenders addressed to W. D. Spence, city clerk, will be received until April 14th for construction of Central Fire Station. Plans, etc., at offices of the architects, Messrs. Lang & Major, and Hodgson, Bates & Butler, associate architects, Grain Exchange Building.

Campbellton, N.B.

Tenders addressed to H. H. Mott, architect, Room 6, Lounsbury Building, will be received until April 17th for erection of Methodist church and S. S. building here.

Collingwood, Ont.

The Fire Committee has chosen the site of the old drill hall as that for the new fire hall. Plans are stated to have been prepared for its erection.

Cookstown, Ont.

The Public Library Board are negotiating for a Carnegie library; the curlers are looking for a site for their new rink.

Cornwall, Ont.

Tenders are called until May 2nd for erection of County House of Industry and Refuge here. A. I. Macdonell, county clerk; A. L. Weeks, architect, Ottawa. Advertisement in "Tenders and For Sale Department" of this issue.

Cranbrook, B.C.

It is understood that in connection with the project for the erection of a club house for the new club a joint stock company will be formed.

Campbellton, N.B.

Tenders addressed to Harry H. Mott, architect, will be received until April 17th for erection of Methodist church and S. S. building here. Plans with above and also with H. H. Mott, architect, St. John.

Edmonton, Alta.

Tenders will be called by the Exhibition directors for the new stock pavilion, of which the cost is $100,000. Plans have been submitted by the architect, Mr. Lines. The provisional plans for Industrial Building, the wing of which will be erected this year, were left for the building committee to report on.

Fernie, B.C.

It has been decided, with the sanction of the ratepayers, to enlarge the Central school to a sixteen roomed building. The city council will be asked to submit to the ratepayers a by-law to raise by debentures $15,000 for building and equipping the enlarged school.

Fort William, Ont.

Tenders are called until April 15th for heating and plumbing in Public Library here. Hood & Scott, architects.

The board of education has decided to make the addition to Central school only four rooms.

Tenders will be received about May 1st for erection of Y. M. C. A. building here. Materials, brick and stone, 4-storeys, size (ground floor) 93 x 100). D. N. F. Nichols, architect, 499 Main street, Winnipeg. G. H. Williamson, secretary. Noted in issue of March 29.

Fredericton, N.B.

The Exhibition Association propose to erect a new amusement hall on the grounds and make improvements to other buildings, $8,000.

Gretna, Man.

Tenders for erection of new brick school will be called. Cost, $12,000.

Guelph, Ont.

The building fund for the Y.M.C.A. will probably exceed the amount aimed at by about $10,000.

At a meeting of a joint committee from the city and county councils it was decided to build a new county jail and jailer's residence. The building will cost $25,000.

Halifax, N.S.

Tenders addressed to W. M. Brown, architect, Roy Building, or to Rev. C. E. McManus, St. Mary's College, will be received until April 28th for construction of the Main Building of St. Mary's College. Plans, etc., at office of the architect.

Haileybury, Ont.

On April 24th a by-law will be voted on to raise $3,500 for the erection of a public market building. T. H. Connor, clerk.

Hamilton, Ont.

Tenders were called until April 8th for erection of addition to City Hospital. Architects, Stewart & Witton, King and Hughson streets.

Kamsack, Sask.

Tenders addressed to John Bowes, sec.-treas., Box 48, will be received until May 1st for erection of addition to school in S. D. No. 1,251, the contractor to supply all material except the stone for the basement. Plans, etc., at office of the architect, E. G. Sherwood, 3 Commonwealth Block, Winnipeg, and at office of the secretary.

Kamloops, B.C.

Tenders have been called for excavation for new hospital here and construction of basement walls. Messrs. Rushton, Baynton, Bethune and others compose the new committee in charge. Architect, Mr. Bird. Revised plans are prepared and tenders for construction will be called. Estimated cost, $100,000.

Little Bras d'Or, N.S.

Tenders addressed to J. W. McIsaac, will be received until April 14th for the erection of a church here.

Maisonneuve, Que.

The rector, Rev. Rural Dean Robinson, and Wardens, have been authorized to purchase land on Milton avenue, 100 ft. x 145 ft. as a site for a new church and rectory.

Montreal, Que.

Tenders addressed to R. C. Desrochers, secretary, Department of Public Works, will be received until April 26th for alterations to the Central post office building here. Plans, etc., at this department and on application to Mr. Theo. Daoust, architect, St. James street, Montreal, Que.

Moncton, N.B.

New tenders will be called for the 2-storey school for S. D. No. 8, Havelock. W. C. Barnes, architect, Moncton.

Moose Jaw, Sask.

The Salvation Army will shortly erect a new citadel on High street, near the Baptist church. They will also build a new residence for the officers on the corner of Ominica street and 13th avenue.

North Vancouver, B.C.

The Board of Trustees invite competitive design for an 8-roomed fireproof school until April 18th. Geo. Campbell, secretary, corner Second street and Lonsdale, P. O. Box 178.

Outremont, Que.

A building permit was granted for the erection of Baptist church, corner of Fairmount and Durocher streets, $50,000.

Tenders addressed to J. Kruse, secretary, Town Hall, will be received until April 19th for erection of fire and police station on St. James avenue. Plans, etc., at office of the above and also at that of Messrs. Hutchison, Wood & Miller, architects, Royal Insurance Building.

Orillia, Ont.

Tenders are called until April 22nd by Department of Public Works, Ottawa, for construction of verandahs at the Hospital for Idiots, here. H. F. McNaughten, secretary. Advertisement in "Tenders and For Sale Department" of this issue.

Ottawa, Ont.

Tenders are called by public school board until April 21st for the plumbing in connection with the schools at Kent street, Laurier avenue, Slater street and Waller street. Plans, etc., at office of W. B. Garvock, superintendent of buildings. Crawford Ross, sec.-treas.

Penticton, B.C.

Plans for the new municipal building were submitted by the town architect, Mr. A. F. Pelton, and call for a concrete building to cost approximately $16,000.

Peterborough, Ont.

Improvements to the extent of about $16,000 were recommended for King Edward school. John Crane, chairman, Board of Education.

Portage la Prairie, Man.

The time for receiving tenders for the construction of a public building here is extended to May 3rd. R. C. Desrochers, secretary, Department of Public Works, Ottawa.

Regina, Sask.

It is stated that the First Baptist Church propose erecting a church at the corner of Victoria avenue and Lorne street during the summer.

Rosetown, Sask.

Tenders addressed to G. H. Irvine, secretary, school board, will be received until May 1st for erection of brick school here. Plans, etc., at office of the above and of the architects, Storey & Van Egmond.

Russell, Ont.

A covered rink for the Hockey club will be erected here. Manager, E. L. Bryan.

St. John, Que.

Plans for erection of municipal building are being considered.

Shetland, Ont.

Tenders addressed to J. L. Wilson & Son, architects, Chatham, will be received until April 15th for all trades in the [illegible] of a concrete block and frame church. Plans, etc., with B. W. Fan-[illegible] secretary, R. R. No. 5, Shetland, Ont., and with the architects.

Stratford, Ont.

Tenders for the improvements to [illegible] Hospital with the exception of the ventilating will be received until [illegible].

Summerland, B.C.

The council will call a meeting of ratepayers to discuss the erection of hospital estimated to cost $15,000. Messrs. W. J. Robinson and E. B. May are interested.

South Vancouver, B.C.

The services of J. H. Bowman, architect, will probably be retained for the new school to be erected in Ward Five, the site for which has been selected.

Tillsonburg, Ont.

On May 1st the ratepayers will vote on a $25,000 by-law for the purpose of rebuilding the public school here. A. E. Raynes, town clerk.

Toronto, Ont.

Plans for the new Central Y. M. C. A. building on College street have been completed and call for nine storeys and basement eventually, six of which will be constructed at once. Cost, about $375,000. Burke, Horwood & White, architects.

Excavation has commenced on the site for the new Parkdale church, corner of Queen street and Callender avenue. The buildings will be of brick, with stone trimmings, and will cost about $50,000. Mr. Burke, of Burke, Horwood & White, architect.

The congregation of West Presbyterian Church propose building their new church on the southwest corner of College and Montrose avenue. Work will commence as soon as possible, it is stated.

It is reported that the site for the new residence for the Lieutenant-Governor now on Bloor street east, will be changed for one nearer the Parliament Buildings.

Building permits were issued for Y. M. C. A., Broadview avenue, $70,000; also for 3-storey school on Innes avenue; 1-storey brick chapel for Wycliffe College on Hoskin avenue, $16,500.

Vancouver, B.C.

The site for the new Mount Pleasant school is ready and preparations for building will be made as soon as N. A. Leech, school architect, has finished plans. Excavation has been started on the site at the corner of Sixth avenue and Bayswater street.

The erection of a new building for the Vancouver Sailors' and Loggers' Institute came up for discussion at their last annual meeting. Work will be started if possible this year. Estimated cost, $100,000. President, C. S. Douglas; secretary, R. C. Proctor.

The council have rescinded its resolution ordering the purchase of the Ross tract in Hastings Townsite for isolation hospital purposes. Direction was given for the acquirement of blocks 4, 9 and 10, in the southwest quarter section of D. L. 44, Hastings Townsite, for isolation purposes.

Mr. F. M. Rattenbury has been instructed to prepare plans for the various group of buildings necessary to complete Parliament Square. At the corners of Government and Superior and of Superior and Menzies streets respectively, will be erected the new museum and the new printing house. Work will begin on the library block which is estimated to cost about $250,000, when detail plans for the principal building are ready, estimated at about five weeks' time.

Victoria, B.C.

The congregation of St. John have purchased a site for their new edifice. Plans are being prepared by Ridgway Wilson, architect. Estimated cost, $80,000.

Watford, Ont.

The Congregational church at this place was destroyed by fire on the 7th inst. Loss $3,000.

Windsor, Ont.

The proposal to erect a new General Hospital to serve the two municipalities was endorsed at a joint meeting and a committee named to secure a suitable site. The erection of the building will not be commenced for some time.

Whitby, Ont.

The Board of Education are calling until April 18th for plans and estimates from architects for erection of 6-roomed High School, with an assembly room. Dr. Chas. F. McGillivary, secretary.

Winnipeg, Man.

The Board of Control have recommended to council the erection of a new science and arts building for the Canadian Industrial Exhibition at a cost of about $9,000.

AWARDED

Belleville, Ont.

The contract for the construction of the new Y. M. C. A. building has been let to Mr. William Alford, the lowest tenderer of the five contractors, $28,961.

Calgary, Alta.

Gunn & Co. were awarded the contract for erection of new Wesley Church. The estimated cost is $55,000, including furniture.

Lethbridge, Alta.

The contract for main Exhibition building was let to Hotson & Leader and includes the floor, which was added in a supplementary tender, for $38,000. The next lowest tender was that of Smith Bros. & Wilson for $40,725. The building must be finished by August 5.

Regina, Sask.

The First Baptist Church have let the contract for the structural work to Smith Brothers and Wilson. The building will be 68 feet by 118 feet. Estimated cost, $60,000.

St. Boniface, Man.

The Convent of the Sisters of the Holy Names of Jesus and Mary, on Provencher street, will be enlarged this summer. J. A. Senecal, the well-known architect and builder, of St. Boniface, has been given the contract, $120,000.

Simcoe, Ont.

The following tenders were received for the erection of public library: Nagle & Mills, $9,871; R. E. Gunton, Simcoe, $10,735; P. E. Eecord & Co., Brantford, $11,731; Leslie & Killer, St. Mary's, $11,746; D. & L. A. Gunton, Simcoe, $11,815; Shultz Bros., Brantford, $11,980; Walter Gunton, Simcoe, $13,600. A recommendation was made that a contract be entered into with Nagle & Mills on the basis of their tender for the building specified, but with such alterations as will bring the price for the completed building down to $9,200. Mr. Shepard, architect.

Toronto, Ont.

The contract for the structural steel work at Caledonia Road School was awarded to Mr. W. H. Saulter at $5,200. Frank Armstrong was awarded the contract for the carpenter work at $20,856. The Property Committee at its last meeting awarded the contract to Mr. M. Hutchinson, whose tender was for $17,555. A communication was read from Mr. Hutchinson stating that he had made a serious error in computing the cost of the work called for in the specifications, and that he wished to withdraw his tender, as he could not do the work called for at his original tender without loss.

Winnipeg, Man.

The contract for the dormitory building for the new provincial agricultural college at St. Vital, is stated to have been let to Thos. Kelly, $200,000.

Residences

Brockville, Ont.

Tenders were called until April 15th for alterations and additions to residence of D. Cummings. A. S. Allaster, architect.

Harwich, Ont.

Tenders addressed to Rev. H. Cowan, minister, Harwich, will be received until April 21st for erection of St. Paul's Presbyterian Manse, Harwich Tp. Mr. P. McGeachy, chairman of committee. James L. Wilson & Son, architects, Chatham.

Toronto, Ont.

Mr. J. Garrett has purchased the corner of Howard street and Glen road, where a large apartment house will be erected.

Vancouver, B.C.

Mr. A. Davidson has presented plans for erection of 5-storey apartment house, Beach avenue, $100,000.

Winnipeg, Man.

A. N. Power will erect a large apartment house on Goulbourne avenue to cost about $30,000. The architect has not yet been chosen.

Tenders addressed to E. D. Tuttle, architect, 701 McArthur Bldg., will be received until April 20th for erection of residence for Mr. W. Argue.

Tenders were called until April 10th for erection of apartment block on Pritchard avenue for F. W. Handle Plans, etc., at office of P. M. Clemens, 331 Garry street.

AWARDED

Victoria, B.C.

A residence will be erected by Col. E. G. Prior on St. Charles, $17,000 Mr. Ridgway Wilson, architect. The contract has been let to Mr. Thomas Ash. Permit has been granted.

Business Buildings and Industrial Plants

Calgary, Alta.

The map showing location of G.T.P. terminals is before the city commissioners. It is expected that it will be approved.

Excavation has been commenced on the site for the Hudson's Bay Company, with W. L. Savage, New York City, in charge. Carter, Halls, Aldinger Company, Winnipeg, contractors.

Chatham, Ont.

The excavation for the factory for the American Pad and Textile Company will commence shortly. The Manson Campbell Company will extend their factory all the way between Adelaide and Prince streets. W. M. Drader is looking for a site for a new brick mill.

Dauphin, Man.

The plans for the fine new C. N. R. station here have arrived and show a building 110 x 50, stone basement, solid brick walls, 3-storeys.

Edmonton, Alta.

Mr. Hopkins is the architect for the six-storey warehouse for the Great West Saddlery Company. Noted in last issue.

The Bank of British North America purchased the National Trust Company property on the northeast corner of Jasper avenue and First street. A new modern bank building will be erected on the site in a year or two. The bank recently purchased a site on Jasper avenue for $70,000, but this will be offered for sale.

Fort William, Ont.

John Morton has purchased the corner of Syndicate avenue and Ridgeway street, on which it is stated a 4-storey building will be erected.

The Superior Plumbing and Heating Company, Victoria avenue, are calling for tenders for removal of rock from corner of Donald and May streets to Norah street.

Goderich, Ont.

The Kingston Furniture Company's plant was damaged to the extent of about $50,000 on the 7th inst.

Guelph, Ont.

The lumber mill of George McAllister was destroyed by fire on the 4th inst. Estimated loss, $15,000.

Hamilton, Ont.

The G. T. R. are considering seriously the erection of a new station here. A. E. Duff, general passenger agent. H. L. Frost, president, Board of Trade.

Highgate, Ont.

The Orford Building & Supply Co., Ltd., recently incorporated, will rebuild the departmental store destroyed by fire last fall at a cost of $10,000. President, Dr. D. P. McPhail; secretary-treasurer, Sam Hanning.

Hillsboro, N.S.

The Albert Manufacturing Company will rebuild their plaster mill here at a cost of about $100,000. Hon. C. J. Osman, manager.

Hull, Que.

The Hull board of trade will ask the C. P. R. to erect a new station in this city.

Kincardine, Ont.

Negotiations are being carried on with the council by Mr. James Malcolm in regard to the location or a furniture factory here.

Lakefield, Ont.

The Canada Cement Company has decided to double the plant here. A great deal of construction work is going on, besides the work of adding new machinery, etc., to the present complement. A. Butchart, manager.

Langenburg, Sask.

The hardware store of Denmark & Burton was destroyed by fire on the 4th inst. Estimated total loss, $30,000.

Lethbridge, Alta.

Tenders were called until April 4th for excavation and concrete work in connection with erection of warehouse for the Western Supply & Equipment Company, Limited.

London, Ont.

Geo. White & Sons will erect a $20,000 addition to their plant at once.

Medicine Hat, Alta.

Certain concessions have been granted by council for the establishment of a glass works here. The agreement calls for the erection of a hundred thousand dollar plant within one year of the date of the passing of the by-law, the employment of from 75 to 150 men, as well as the commencement of a similar plant before the end of five years. The city agrees to give two hundred and fifty thousand feet of gas per day, water and electric power at manufacturers' rates, and a site of five acres.

Tenders addressed to Bert D. Keck, architect, Crookston, Minn., or to the Moose Grocery Company, Moose Jaw, Sask., will be received at the office of the General Brokerage Company, Grand Forks, N. Dak., until April 21st for construction of a wholesale warehouse for the Medicine Hat Grocery Company, size of building 80 ft. x 110 ft. Plans, etc., at the Winnipeg Builders' and Treders' Exchange and at the local Exchange and at the offices of the architect and of Moose Grocery Company.

Montreal, Que.

The G. T. P. management are stated to be planning the erection of 140 new stations.

Moose Jaw, Sask.

W. Zimmerman is the architect in charge of the hotel to be erected here by local capitalists. Tenders for the excavation have already been called.

Ottawa, Ont.

Managers of a large bottling works have been in the city seeking a location for a factory. It is very probable that it will locate in Ottawa.

McFarlane & Douglas, Limited, it is announced, will erect a large factory here for the manufacture of fireproof steel doors, windows, office desks and cabinets. A building site has been purchased on Laurier avenue, 116 x 140 ft., adjoining property owned previously by them.

Peterborough, Ont.

The C. P. R. has submitted an agreement to the city which provides for the acquiring of a large amount of city property for the building of sidings and freight sheds, etc., in connection with the company's new Georgian Bay grain route. The company agrees to have the line in operation in two years.

Port Arthur, Ont.

F. H. Keefer, K.C., is the authority for the statement that about $7,500,000 British capital will be spent shortly on a pork-packing plant in this vicinity.

Red Deer, Alta.

It is understood that the C. N. R. will erect offices for the construction department near the Alberta Grain Company's elevator, which they have rented.

Work has been started on cleaning up the Northern Bank corner, ready for the excavations for the new bank building.

Regina, Sask.

It is reported that the National Trust Company will start construction on erection of their building at the corner of Cornwall street and 11th avenue.

The tenders for the new Imperial Bank are being called. It will be two storeys in height and will cost in the neighborhood of $40,000. The building will be completed this year. Noted previously.

Saskatoon, Sask.

Cushing Bros. will erect a first-class planing mill, sash and door factory. They will produce power by steam and generate electricity as motor power for machinery. F. M. Beatty, local manager.

Seaforth, Ont.

The Scott block was destroyed by fire on the 4th inst. Estimated loss on building, $14,000.

Stittsville, Ont.

The store owned by W. W. Mann was destroyed by fire on the 4th inst. Estimated loss, $20,000.

Manchester, Robertson & Allison, Ltd., are planning the erection of a brick addition to their building, 50 x 20 feet.

Strassburg, Ont.

The hardware store owned by H. B. Devine was destroyed by fire last week. Estimated loss, $30,000.

A factory for the manufacture of vinegar and pickles, with a capital stock of $20,000, is to be established here.

Sydney, N.S.

Tenders for the construction of the fertilizer plant for Alex. Cross & Sons, Limited, Glasgow, to be erected here, will be opened shortly. Estimated cost about $100,000; C. R. Walker, Canadian representative; Matthew Goldie, manager.

Toronto, Ont.

Notice has been served by the C.P.R. on all its tenants in the district bounded by Cherry, Water, Ocerend, Tate and Front street, to vacate their premises by the end of the month. Construction will then begin on the new freight yards and freight sheds which the company will erect in that section.

Victoria, B.C.

Tenders were received until April 12th for erection of a [illegible] building and basement [illegible] street for P. R. Brown. [illegible] architect.

Wallaceburg, Ont.

[illegible] & Williamson, architects won the competition for erection of new hotel to be built for Mr. Chas. Dupont. Plans are now being prepared and tenders are invited until May 1st.

Winnipeg, Man.

Tenders are requested for the extension of the passenger car shops, by the C. P. R. management, until April 18th. Frank Lee, division engineer.

The architect in charge of the warehouse for the Ontario Wind Engine and Pump Co., Ltd., is G. M. Miller, Toronto. Estimated cost, about $50,000.

The Hudson Bay Company has purchased property between Colony and Vaughan street for their large store. Estimated cost, about $2,000,000. John Woodman, Canadian representative of the company's architects, London, Eng.

The property at the southeast corner of McDermot avenue and Dagmar street has been purchased by E. Loftus, 705 McArthur Building. It is understood that a large business block will be erected here and that clearing of the site and construction will commence at once.

Tenders addressed to D. W. McCuaig, chairman, Manitoba Elevator Commission, will be received until April 14th for tearing down the Dominion Elevator at Miami and also for rebuilding same at Grosse Isle, Man. Plans, etc., at office of the Manitoba Elevator Commission, 279 Garry street.

The Canada Cement Company, it is stated, will establish a plant here as quickly as possible. It will have a capacity of 400,000 barrels per annum. The plant will at first be confined to the grinding of clinkers shipped to Winnipeg from the east. Later, when completed, all the operations of manufacturing will be carried on there.

Plans for a fourteen storey building to be erected on Main street, were approved by the fire, water and light committee. It will take about two years to complete the building. The plans were presented by Peter Lyall, Jr., whose firm will erect the skyscraper, which will be 190 feet in height. It is said that the building is being built for an English syndicate.

AWARDED

Brandon, Man.

Claydon, Bros., Winnipeg, have secured the contract for a new building for the Dominion Bank on Rosser avenue at a cost of $20,000. Work will commence at once.

Galt, Ont.

The contract for erection of addition to plant of R. McDougall Co., has been let to Contractor Wm. Edmonds.

Lethbridge, Alta.

The J. E. Lussier Construction Company of this city, has been awarded the contract for building stations at Tompkins, Suffield, Burdett, Bow Island and Redcliffe, and a brick and stone extension to the Medicine Hat station, for the C. P. R.

Montreal, Que.

Messrs. Byers & Anglin have been awarded the contracts for the following: A two-storey factory on Chatham street for the Canada Paint Company. The structure will be of reinforced concrete and faced with brick; it will be 64 ft. x 160 ft., and the estimated cost is $16,000. Work has already been started on the foundation. Messrs. Nobbs & Hyde, architects. A concrete warehouse for Mr. Alphonse Piche, butcher, Dorchester street. It will be a four-storey structure and cost about $18,000. Alterations in the Bank of Montreal, including the removal of a stairway and the construction of new flooring and office space, the whole to cost some $10,000.

Vancouver, B.C.

Patrick J. Donohue, architect, Inns of Court Building, Vancouver, writes F. H. Foreshaw has secured the contract for erecting a 4-storey and basement hotel of reinforced concrete for Sam Kee, cost $110,000. P. S. Donohue, architect, Inns of Court Building.

Victoria, B.C.

Dinsdale & Malcolm have been awarded the contract for the removal of the old buildings which now occupy the site for the structure to be occupied by the Union Bank of Canada and the Elliott building. R. T. Elliott, K.C., Summit avenue, is interested in the latter.

Woodstock, Ont.

The contract for erection of addition to the factory of the Crown Lumber Company has been given to Mr. Bachman, Muskegon, Mich. It will be of cement blocks, in size 155 x 70 feet, and one storey high.

Power Plants, Electricity and Telephones

Bowmanville, Ont.

The by-law in favor of the sale of the electric light plant to the Seymour Power and Electric Company, a subsidiary of The Electric Power Company, carried.

Brandon, Man.

Mr. Farquharson, Fort William, who superintended the construction of street railway there, has been asked to confer with City Engineer Speakman in regard to the location of the route here.

Edmonton, Alta.

The city council has finally decided upon terms of agreement with the International Heating & Lighting Company, of Cleveland, for a franchise to manufacture and distribute artificial gas, and a by-law will be submitted to the ratepayers next month. The franchise is for 25 years, the city retaining the right to purchase by the end of that time and every five years thereafter. The initial price fixed by the agreement is $1.65. The company guarantees to supply gas within 18 months. Their investment in the city will be over half a million dollars. Edmonton at the present time is the largest city on the continent which is without a gas supply.

Lakehurst, Ont.

Tenders addressed to David Weir, secretary, lakehurst, will be received until April 21st for digging of the holes, the erection of the poles and the stringing of the wires for any part of the construction of the municipal telephone line from Ennismore, here, a distance of 19 or 20 miles.

Moose Jaw, Sask.

Tenders are called until April 24th for supply of about 400 white cedar poles for use in the Electric Light Department. J. D. Peters, electric superintendent; W. F. Heal, city clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Portage la Prairie, Man.

Alds. Charles Sharpe and Sweet and Mayor Garland were appointed on the committee to report on the power proposition as contained in a letter from Mayor Evans of Winnipeg.

Quebec, Que.

Orders have been placed for fifty freight cars of the Gondola type, 60,000 lbs. capacity, by the Quebec Railway, Light, Heat & Power Company. C. E., A. Carr, general manager.

Regina, Sask.

Tenders addressed to S. P. Porter, deputy minister railways, telegraphs and telephones, will be received until April 22nd for construction of the following lines: Moose Jaw, Swift Current, Abernethy-Strassburg, Saskatoon-Battleford, Wolseley-Windthorst, Saskatoon-Biggar.

Revelstoke, B.C.

The by-law granting the city council the sum of $50,000 for the completion of power plant was approved by the ratepayers. The city will now be in a position to treat with the C. P. R. in the matter of furnishing power to shops.

Saskatoon, Sask.

The council has engaged Mr. J. B. McRae, engineering expert, of Ottawa, to report on the street railway proposition.

St. Thomas, Ont.

The following are the estimates of the cost of proposed street railway improvements as compiled by City Engineer, Mason H. Baker: Overhauling Belt line, $18,970; overhauling Wilson avenue line, $3,400; overhauling G. T. R. Station line, $1,750; repairing present cars, $2,500; three new cars, $9,000; total, $34,620.

Thessalon, Ont.

It is reported that this municipality will instal an electric light plant and power house.

Toronto, Ont.

The city council adopted the report of the special committee on subways for underground street railway traffic, which recommended that the city engineer be requested to prepare plans for a subway on Yonge street from the Union station to St. Clair avenue; that the board of control be requested to invite tenders forthwith, and submit the question to the people on the receipt of a reasonable tender; and that $5,000 be provided to secure such detailed plans and specifications.

Victoria, B.C.

The B. C. Telephone Company will require equipment for about 900 additional telephones.

Weyburn, Sask.

Tenders are called until April 15th for construction of about 27 miles of telephone system by the North Weyburn Rural Telephone Company.

AWARDED

Calgary, Alta.

The contract for building of coal conveyors and bunkers for the power house at Victoria Park has been awarded to Phillips & Lang, of Chicago, at a cost of $42,300. The electrical machinery will be furnished by the C. W. Hunt Company, of New York. Contract must be completed within four months.

Contract for equipment for the electrical plant at Victoria Park were recommended as follows: a 1600 k.w. turbo-generator set from the Allis-Chalmers-Bullock Company, $41,965. This is to be installed and in operation by August 22 next under a bond of $5,000; The Belliss-Morcom Company tendered for a 1500 k.w. generator, but could not deliver it before ten months. Gorman, Clancey & Grindley's tender for a 2-ton crane at a cost of $3,190. The Canadian Westinghouse Company for a 100 k.w. exciter for $4,300, the lowest; the Allis-Chalmers-Bullock Company will have charge of removing and re-erecting the old boilers from the power house in the west end to Victoria park, and such necessary work as is required, at a cost of $36,790.

Quebec, Que.

We are informed that the Quebec Railway, Light, Heat & Power Company, Limited, have awarded contract for construction of the double-track electric railway from Beauport Station to Montmorency Falls Park at Kent House, a distance of 3.3 miles. The railway will be rock-ballasting throughout, all 80-lb. A. S. C. E. steel rails, and the work is to be completed by June 20th. J. G. Brill Company, Philadelphia Car-builders, have supplied ten open single-truck car bodies for the Quebec County Railway. C. E. A. Carr, general manager.

Miscellaneous

North Bay, Ont.

The Insurance Underwriters in their report condemn the fire fighting appliances and waterworks system and recommend sweeping changes. N. R. Wilson, travelling inspector, Canadian Fire Underwriters' Association; M. W. Flannery, town clerk.

Ottawa, Ont.

Tenders are called until April 21st for improving lower entrance of Farran's Point Canal, St. Lawrence. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders are called until April 14th by Department of Railways and Canals for supply and delivery of various articles of hardware, castings, for use on the Cornwall Canal. L. K. Jones, secretary. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders are also called until April 21st for enlargement of Canal office on the Cornwall Canal. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders addressed to R. C. Desrochers, secretary, will be received until April 25th for dredging required at the following: Big Creek, Big Island, Echo Bay, Kincardine, Port Elgin, Kingsville, Penetanguishene, River Thames, Salt Point (Presqu'Ile), and Wiarton.

The building permits recently issued include: James Wilson, dwelling, Strathcona avenue, $3,500; A. D. Helmer, residence, Lisgar street, George Lester, builder, $2,500; Dominion Methodist Church, alteration to entrance, J. A. Ewart, architect, George Crain, builder, $2,500.

Hon. Charles Murphy outlined a plan before a meeting of the ratepayers of Ottawa and Eastview for preventing floods of the Rideau river. It is by dams at Porter's Island and some farther up the river. It will be taken up by the ratepayers who will urge the government to take some action in this connection.

Toronto, Ont.

The following building permits have been issued recently Massey Estate, balcony to fire escape, Shuter and Victoria streets, $5,000; G. S. Hope & Sons, 1 pr. semi-det. 2-storey brick dwellings, Shaw street, $4,500; R. M. Mackey; 3 att. 2-storey brick dwellings, Lansdowne avenue, $6,000; G. B. Cooney, 1 pr. semi-det. 2-storey and attic brick dwelling, Ossington avenue, $4,000; Thos. Maguire, 2-storey brick dwelling, Dunvegan road, $6,500; Chas. H. Neely, 2-storey and attic brick dwelling, Highlands avenue, $8,500; Geo. Pudlew, 2½-storey brick dwelling, on Rosehill avenue, $4,500; J. C. Sloan, 2-storey brick dwelling ,Fairview Boulevard, $4,500; A. Henderson, 2 pr. semi-det. 2-storey brick dwellings, Cooper avenue, $7,400; R. C. Bustard, 2½-storey brick dwelling, corner Rowanwood & Cluny, $9,000; J. H. Jackson, 1 pr. semi-det. 2½-storey brick dwellings, 11 Quebec avenue, $4,900; John Hinds, 1 pr. semi-det. 2-storey and attic brick dwellings, Ossington avenue, $5,000; R. C. Bustard, 3 det. 2½-storey brick dwellings, near Rowanwood avenue, on east side Cluny avenue, $18,000; G. H. Webb, 2 det. 2½-storey brick dwellings, Indian road, $8,000; H. H. Hudson, 2-storey brick dwelling, Russell Hill, $6,500; F. G. McBrien, 3 pr. semi-det. 2-storey brick dwellings, cor Osler & Royce avenue, $12,000; Mrs. Grafton, 1 pr. semi-det. 2½-storey brick dwellings, near Broadview north side Dearbourne, $7,000; R. W. Harrison, 3 att. 2-storey brick dwellings, 20, 22, 24 Delaney Crescent, $4,500; Robt. Luxton, 6 att. 2-storey roughcast dwellings, brick fronts, Globe, $8,000; Mr. Steele, 2-storey brick store and dwelling, Gerrard street east, $5,500; Houghton & Breeze, 1 pr. semi-det. 2½-storey brick dwellings, Lappin avenue, $4,600; J. C. Budreo, 3-storey brick stores anad dwellings, Queen street, $8,000; G. Brady & Son, 2 det. 2-storey and attic brick dwellings, Woodlawn avenue, $8,000; Mrs. Alice Adams, 2½-storey brick dwelling, 9 High Park Boulevard, $5,000; Morris & Thurston, 1 pr. semi-det. 2-storey brick dwellings, Wallace ave., $4,500; E. Grainger, 1 pr. semi-det. 2-storey and attic brick dwellings, Balmoral avenue, $6,000; S. B. Coon (in trust), 2½-storey brick dwelling, Rowanwood, $4,200; S. B. Coon (in trust), 2½-storey brick dwelling, Rowanwood, $4,200; S. B. Coon (in trust), 2½-storey brick dwelling, 26 Rowanwood avenue, $4,200; W. A. Laughton, 2½-storey brick dwelling, 33 Dunvegan road, $9,000; Robt. Ewing, 4 det. 2-storey and attic brick dwellings, north side Thorold, $12,000; Waters & Elliott, 4 pr. semi-det. 2-storey brick dwellings, Campbell avenue, $13,500; Waters & Porter, 3 pr. semi-det. 2-storey brick dwellings, west side Shaw street, $12,000; Johnston & Day, 4 att. 2-storey roughcast dwellings, brick fronts, Sproatt street, $8,000; W. W. Hiltz, 3 dta. 2-storey and attic brick dwellings, Hampton avenue, $7,500; M. Yetman, 2 pr. semi-det. 2-storey brick dwellings, west side Dufferin street, $8,000; H. H. LeDrew, 3 att. 3-storey brick dwellings, 271-3-5 Westmoreland avenue, $6,000; T. J. Bowen, 3 att. 2-storey brick dwellings St. Helens avenue, $7,500; J. J. Downey, 3 att. 2-storey brick dwellings, Indian road, $7,500; J. J. Downey, 3 att. 2-storey brick dwellings, Humberside avenue, $7,500; J. J. Downey, 1 pr. semi-det. 2-storey brick dwellings, Indian road, $5,000; Wycliffe College, 2½-storey brick dwelling, Queen's Park, $14,000; J. Bishop, 3 att. 2½-storey brick dwellings, 127-131 Mutual street, $7,500; Niagara Navigation Company, 1-storey steel freight shed, foot of Yonge street, $7,500; Waters & Elliott, 1 pr. semi-det. 2-storey brick dwellings, Yarmouth Gardens, $4,500; A. A. Mitchell, 2 det. 2-storey and attic brick dwellings, Oriole road, $8,000; Wm. Hodgkinson, 3 att. 2-storey roughcast dwellings, brick fronts, DeGrassi street, $5,400; E. Smith, 1 pr. semi-det. 2-storey brick dwellings, Barton avenue, $5,000; W. H. Baldwin, 2½-storey brick dwelling, 332 East Roxborough street, $5,000; Waters & Elliott, 1 pr. semi-det. 2-storey brick dwellings, Yarmouth Gardens, $5,000; Alex. Mills, 2-storey and attic brick dwelling, Highlands avenue, $,500; G. H. Webb, 2½-storey brick dwelling, Indian road and Walter street, $4,500; A. McGill, 2 det. 2½-storey brick dwellings, Mavety street, $6,000; W. W. Hiltz, 2 pr. semi-det. 2-storey brick dwellings, 71-73 Hampton, $9,000 Wycliffe College, 3-storey brick addition to Wycliffe College (residence), $12,000; Otto Higel, 1-storey brick factory, King street, near Bathurst, $30,000; Dundas Building Co., 2-storey brick apartments, east side Roncesvalles avenue, $20,000; Chas. Hough, 2 det. 2-storey and attic brick dwellings, east side Alhambra, $7,000; J. E. Peterkin, 2 pr. semi-det. 2-storey roughcast dwellings, brick fronts, north side Strathcona, $6,000; J. D. Allan, 3-storey brick apartments, south side Ulster street, $7,500; A. Doney, 2-storey and attic brick dwelling, St. Clair avenue, $6,000; F. L. Beecroft, 1 pr. semi-det. 2-storey and attic brick dwellings, 72-72½ Pembroke street, $6,000; Fred. Brumhall, 2 pr. semi-det. 2-storey brick dwellings, north side Dupont street, $8,000; J. H. Mills, 2-storey and attic brick dwelling, Indian road, $4,600; E. M. Biette, 1 pr. semi-det. 2½-storey brick dwellings, Palmerston avenue, $5,000; Mr. Dennis, 1 pr. semi-det. 2-storey avenue, $4,500; Gordon Marr, 2 det. 2½-storey brick dwellings, north side Humberside avenue, $5,000; The McGee Estate, alterations to theatre, 93 Yonge street, $10,000.

Whitby, Ont.

Tenders will be received until April 15th for $8,850 2-years local improvement debentures, etc. J. White, town clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Late News

Brandon, Man.

The date for receiving tenders for street paving has been extended to April 28th. R. E. Speakman, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Calgary, Alta.

The [illegible] T. Eaton Company, Limited, Toronto, will erect in Calgary a large departmental store. W. J. Gunn has been here in connection with the location

Montreal, Que.

Tenders addressed to [illegible] secretary, Harbor Commissioners, will be received until April 18th for the con-

(Continued on page 60)

Tenders and For Sale Department

Steam Shovels

[illegible] Buffalo, N.Y., [illegible] shovels; late [illegible]l, with new extra large boilers and in excellent condition; also one 70-ton. These will stand most rigid inspection and we are offering them at unusually low prices. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle Street,
Chicago, Ill

City of Winnipeg

Electrical Distribution System

Tenders For
Switching Equipment
for Substation No. 1

Tenders will be received by the undersigned up to 11 a.m., of **Thursday, April 27th, 1911**, for the supply and installation in Sub-station No. 1, on King Street, Winnipeg, of electrical switching equipment for this station. Plans and specifications may be obtained at the office of the Power Engineers, Smith, Kerry & Chace, Carnegie Library Building, Winnipeg.

Each tender must be accompanied by marked cheque for five (5) per cent. of the amount of the amount of tender. The Board reserves the right to reject any or all tenders or to accept any bid which may appear to the City's advantage

M. PETERSON,
Secretary.

Board of Contorl Office,
Winnipeg, March 27, 1911. 14-15

PAVING

City of Fort William, Ont.

Sealed and endorsed tenders, addressed to the Chairman of the Works Committee, will be received at the office of the City Clerk before 5 o'clock p.m., of **May 4th, 1911**, for the paving with asphalt block, sheet asphalt or bitulithic of—

May street, 46 ft., curb to curb., approxiately 5,700 square yards.

Brodie street, 46 ft., curb to curb., approximately 8,400 square yards.

Plans, Specifications and Forms of Tender may be obtained at the office of the City Engineer.

Each tender must be accompanied by a marked cheque for $1,000.

The lowest or any tender not necessarily accepted.

JOHN WILSON,
City Engineer's Office, City Engineer.
Fort William, April 1, 1911. 14-16

City of Regina

Fire Hall Equipment

Sealed tenders addressed to the City Commissioner, City Hall, Regina, Sask., will be received up to **Monday, April 17th, 1911**, for the following Fire Hall equipment: One Combination Hose and Chemical Wagon, 1,700 feet of Double Jacket Rubber Lined Fire Hose, 2 Hydrant Gate Valves, Two Play Pipes, and other apparatus.

All information will be furnished on application to the undersigned, or to W. White, Chief of the Fire Brigade, Regina.

A. J. McPHERSON,
14-15 City Commissioner.

City of Regina

Tenders for
1 Squeegee Street Washing Machine

Sealed tenders addressed to the undersigned will be received until 12 o'clock noon, **April 15, 1911**, for 1 squeegee street washing machine for the City of Regina.

A. J. McPHERSON,
City Commissioner.
Regina, Sask. 14-15

City of Saskatoon

Water Works and Sewerage Works

Sealed tenders, addressed to the City Commissioners, Saskatoon, and marked as to contents, will be received up to 12 o'clock noon on Friday, **April 21st, 1911**, for the following material:

Contract No. 89.—Furnishing cast iron pipe and specials.

Contract No. 90.—Furnishing fire hydrants, gate valves, and valve boxes.

Contract No. 91.—Furnishing sewer pipe and junctions.

Contract No. 92.—Furnishing manhole frames and covers.

Specifications, instructions to bidders, general conditions, forms of tender, and forms of agreement, may be seen at the office of the City Engineer, Saskatoon, or at the office of "The Canadian Engineer," at the following addresses:

Toronto, 62 Church Street.
Montreal, Board of Trade Building.
Winnipeg, Room 315 Nanton Building.

Copies of instructions to bidders, and forms of tender, will be furnished on application to the City Engineer, but copies of plans and specifications will not be furnished.

The lowest or any tender not necessarily accepted.

JAMES CLINKSKILL,
W. B. NEIL,
City Commissioners.
Saskatoon, Sask.,
March 30th, 1911. 14-15

Township of North Easthope

Tenders Wanted

Sealed tenders marked "Tenders for Western Drain," and "Tenders for Kichne Drain," will be received by the undersigned up to 2 p.m. on **April 17, 1911**. The council will proceed to consider the tenders immediately after the above hour at the Town Hall, North Easthope.

Plan, profile and specifications can be seen at the clerk's office, Amulree, or at the office of John Roger, O.L.S., Mitchell.

The Western Drain commences on Lot 33, Con. 7, and has its outlet on the Northern Gravel road.

The Kuhne Drain commences on Lot 24, Con. 7, and has its outlet on Lot 38, Con. 2.

A deposit of $100 is required on the Western Drain contract and $200 on the Kuhne Drain contract. Cash or marked cheque.

The lowest or any tender not necessarily accepted.

J. D. FISHER,
Tp. Clerk, North Easthope,
Amulree P.O.
Dated the 3rd day of April, 1911. 14-15

Department of Railways and Canals,
Canada

Ontario—St. Lawrence Canals

CORNWALL CANAL

Sealed tenders addressed to the undersigned and endorsed "Tender for improving Upper Entrance to Lock No. 19," will be received at this office until 16 o'clock on **Saturday, April 15th**.

Plans, Specifications, and Forms of Contract to be entered into can be seen on and after March 18th, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wages Schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted Bank cheque for the sum of $1,500 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The Cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES,
Secretary.

Department of Railways and Canals,
Ottawa, March 21st, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 14-15

City of Edmonton, Alberta

Sealed tenders marked "Tenders for Trunk Sewer," will be received by the City Commissioners up till 3 p.m., **May 2nd, 1911**, for the supplying of all materials and the construction, in tunnel of a concrete sewer ten feet six inches (10 ft. 6 in.), in internal diameter and approximately 3,290 feet long.

Plans and specifications and all particulars may be obtained from the City Engineer's office, Edmonton, on deposit of a marked cheque for the sum of $25.00, which will be held until the return of plans and specifications. Duplicates of which may be seen at the office of the Contract Record, B34 Board of Trade Building, Montreal, Que.

Lowest or any tender not necessarily accepted.

CITY COMMISSIONERS.
A. J. LATORNELL,
City Engineer,
Edmonton, Alta. 14-16

Department of Railways and Canals, Canada

St. Lawrence Canals

CORNWALL CANAL

Tender for Hardware, Castings, &c.

Sealed tenders for supplies addressed to the undersigned, will be received until 16 o'clock on **Friday, April 14th, 1911**, for the supply and delivery of various articles of hardware, castings, for use on the above canal for the year 1911-1912.

Specifications, forms of tender and other information may be obtained from the purchasing agent of the Department of Railways and Canals, Ottawa, on and after this date.

The lowest or any tender not necessarily accepted.

By order,
L. K. Jones, Secretary.
Department of Railways and Canals,
Ottawa, March 30, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid ofr it. 15-15

Notice to Contractors

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, up to noon on **Tuesday, April 25, 1911**, for the supply of a Priming Equipment for Centrifugal Pumps at the Toronto Filtration Plant.

Envelopes containing tenders must be plainly marked on the outside as to contents.

[illegible] obtained at the office of the City Engineer, [illegible]

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer), not members of the City Council or officer of the Corporation of the City of Toronto, or in lieu of said sureties [illegible] aforesaid.

The usual conditions relating to tendering as prescribed by City by-law must be strictly complied with or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
15-15 Chairman Board of Control.
City Hall, Toronto, April 4th, 1911.

BRIDGE TENDERS

Sealed tenders will be received by Jas. Beattie, Esq., Clerk of Wellington County, Fergus, Ont., until 2 p.m. on Wednesday, April 19, for the construction of an 80 ft. concrete arch bridge, 26 ft. wide, with ornamental railing, at Fergus.

Plans and specifications may be seen at the offices of the undersigned.

BOWMAN & CONNOR, Engineers,
36 Toronto Street, Toronto.
and Court House, Berlin, Ont.

JAS. BEATTIE, County Clerk,
Fergus, Ont.

J. A. WILKINSON, Chairman of Com.
14-15 Morriston, Ont.

CITY OF REGINA

Saskatchewan, Canada

Tenders for Sewage Pumps and Motor. Switchboard and Apparatus. For Sewage Disposal Works.

Sealed tenders marked "Tenders for Sewage Pumps, Disposal Works," will be received by the City Commissioners, Regina, until 12 o'clock noon, **April 30th, 1911**, for the supply of One 1,000,000 gallons per 24 hours capacity Pump and Motor. Switchboard and Apparatus.

Full particulars may be had upon application to the Chief Engineer, Trunk Sewer Works.

The lowest or any tender not necessarily accepted.

(Signed) JOHN MARSHALL,
Chief Engineer,
Trunk Sewer Works.
April 6th, 1911 15-17

Department of Railways and Canals, Canada

Ontario—St. Lawrence Canals

CORNWALL CANAL

Sealed tenders addressed to the undersigned and endorsed "Tender for Canal Office Enlargment" will be received at this office until 16 o'clock on **Friday, April 21**.

Plans, specifications and form of contract to be entered into can be seen on and after April 3, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $500 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES, Secretary.
Department of Railways and Canals,
Ottawa, March 30, 1911

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 15-16

Tenders for Debentures

Tenders will be received at the Town Clerk's Office, Whitby, up to Saturday, **15th April, 1911**, for $8,850, 20-years Local Improvement Debentures, bearing interest at 5 per cent. payable annually, in payments of $710.15. Debentures dated 1st May, 1911, and payable at Town Treasurer's Office, Whitby.

By-law validated by Ontario Legislature.

JOSEPH WHITE,
15-15 Town Clerk.

TENDERS
FOR
COUNTY HOUSE OF REFUGE

Sealed tenders will be received by the undersigned, up to noon of **Tuesday, May 2nd, 1911**, for the erection of a County House of Industry and Refuge at Cornwall.

Plans and Specifications can be inspected at my office in County Building here, at the store of Mr. J. A. C. Hout, Alexandria, at residence of Mr. C. E. Cameron, Iroquois, or at the office of Mr. A. L. Weeks, architect, Ottawa.

Marked cheque for 5 per cent. of tender, payable to my order, to accompany tender. Cheques will be immediately returned to unsuccessful tenderers after contract awarded.

Dated at Cornwall this 8th day of April, 1911.

ADRIAN I. MACDONELL,
15-16 County Clerk.

Department of Railways and Canals, Canada

Ontario—St. Lawrence Canals

Farran's Point Canal

Sealed tenders addressed to the undersigned and endorsed "Tender for Improving Lower Entrance" will be received at this office until 16 o'clock on **Friday, April 21**.

Plans, specifiactions and form of contract to be entered into can be seen on and after April 3, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wage schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $9,000 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to [illegible] accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES, Secretary.
Department of Railways and Canals,
Ottawa, March 30, 1911

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 15-16

CITY OF MOOSE JAW
Saskatchewan

Tenders

[illegible] will be received by the under [illegible] Monday, [illegible] 24th, 1911 [illegible] approximately [illegible] Electric Light [illegible]

[illegible] may be ob [illegible] or to J. D. Peters, Electrical Superintendent, Moose Jaw.

Tenders to be at a price f.o.b. Moose Jaw [illegible] be endorsed "Tenders for Electric Light [illegible]"

The lowest or any tender not necessarily [illegible]

W. F. HEAL,
City Clerk.

Tenders for School Building

[illegible] by the undersigned, up to **Monday, the 1st day of May next (1911),** at 5 o'clock p.m., for building a school house of brick with cement trimmings, on Hickman street, West Highlands, Town of Amherst, according to plans and specifications which may be seen at Town Office, Amherst, and at the office of Leslie R. Fairn, architect, Aylesford, N.S., on and after **Monday, April 17th, instant.** Contractor to do all work and supply all material.

Tenders to be sealed and marked "Tenders for School Building" and must be accompanied with a certified cheque for $500 payable to the Town of Amherst, which amount will be forfeited to the said Town should the party whose tender is accepted neglect or refuse to execute a satisfactory contract to complete the work.

The Town Council do not bind themselves to accept the lowest or any tender.

By order of Town Council
W. FRED DONKIN,
Town Clerk.
Amhert, N.S., April 8, 1911. 15-17

Department of Public Works
Ontario

To Contractors

Sealed tenders addressed to the undersigned and addressed "Tender for Verandahs," will be received at this Department until noon on **Saturday, the 22nd April, 1911,** for the construction of Verandahs at the Hospital for Idiots, Orillia.

Plans and specifications can be seen at this Department and at the above institution. An accepted bank cheque payable to the order of the Hon. J. O. Reaume, Minister of Public Works, for five per cent. of the amount of the tender and the bona fide signatures and addresses of two sureties or the bond of a Guarantee Company, approved by this Department, for the due fulfilment of the Contract must accompany each tender. Cheque will become forfeit to the Crown in the event of the successful tendered refusing to carry out the work within ten days after the acceptance.

The Department will not be bound to accept the lowest or any tender.

By order,
H. F. McNAUGHTEN,
Secretary, Public Works Dept.

Department of Public Work, Ontario,
Toronto, April 10th, 1911.

Newspapers publishing this advertisement without authority will not be paid for it. 15-15

Toronto Main Drainage

Low Level Interceptor:
Section No. 5—3,350 linear feet.
Section No. 6—2,830 linear feet.
Section No. 7—3,778 linear feet.
Section No. 8—3,238 linear feet.

Sealed tenders for the laying of reinforced concrete pipe sewer complete will be received by registered post only, addressed to the Chairman of the Board of Control, Toronto, Ontario, up to noon of **May 9th, 1911.** The concrete pipe to be laid will be supplied by the City. The diameters are as follows: For Section No. 5, 60 inches; for Section Nos. 6, 7 and 8, 66 inches.

Plans and specifications will be on file at the office of the CONTRACT RECORD, B-34 Board of Trade Building, Montreal, after Monday, April 18. Plans may be seen, and specifications and further information obtained from the Main Drainage Works, City Engineer's Office, Toronto.

G. R. GEARY, Mayor,
15-16 Chairman, Board of Control.

VICTORIA, B. C.

Tenders Wanted

Sealed bids marked "Tenders for Pavement" will be received by the purchasing agent up to 4 o'clock p.m. of **Friday, April 28, 1911,** for paving with asphalt approximately forty miles of street. Plans and specifications may be obtained at the City Engineer's office. The lowest or any tender not necessarily accepted.

WM. NORTHCOTT, Purchasing Agent.
ANGUS SMITH, City Engineer.
Victoria, B.C., April 10,1911. 15-15

CITY OF REGINA

Waterworks

Cast Iron Pipe

Sealed tenders marked "Tenders for Cast Iron Pipe" will be received by the City Commissioners until 12 o'clock noon, **April 26th,** for supply of approximately:

900 tons 18-in. c.i. pipe.
150 tons 6-in. c.i. pipe.

Alternative prices on steel pipe will be considered.

Full particulars may be had on application to the City Engineer.

A marked cheque for $2,000 must accompany each tender.

The city reserves the right to reject any or all tenders.

(Signed) L. A. THORNTON,
15-15 City Engineer.

CITY OF BRANDON

Street Paving

Sealed tenders marked "Tenders for Paving," will be received by the City Clerk, Brandon, Manitoba, until 12 o'clock at noon on **Friday, the 28th day of April next,** for paving the following streets in the City of Brandon:

Rosser avenue, Twelfth street to Sirth street.
Pacific avenue, Eleventh st. to Eighth st.
Princess avenue, Tenth street to Eighth st.
Eleventh street, Rosser ave. to Pacific ave.
Tenth street, Princess ave. to Pacific ave.
Ninth street, Princess ave. to Pacific ave.
Eighth street, Princess ave. to Pacific ave.

Tenders are invited for Wood Block, Asphalt Block, Sheet Asphalt, Granitoid, Bitulithic and Vitrified Brick, on 5-inch and 6-inch concrete foundations, or other kinds of pavements.

Proprietors of patented pavements are requested to furnish their special specifications.

An accepted bank cheque for 5 per cent. of amount of tender must accompany each bid.

The lowest or any tender not necessarily accepted.

Further particulars can be obtained from City Engineer's Office.

R. E. SPEAKMAN,
City Engineer's Office, City Engineer.
Brandon, March 31, 1911. 14-16

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No ten cents extra

Position wanted as general foreman bridge or structural work, open for engagement, 16 years experience, technical education, thorough knowledge of the trade in all its branches. Box 256, Contract Record, Toronto, Ont., 15-15

POSITION WANTED—AS Foreman on railway, sewer, or other contract work, by man of wide experience. At liberty to accept favorable terms immediately. Address, Box 260, Cotract Record, Toronto, Ont. 15-17

Late News

(Continued from page 57)

struction of two concrete wharf sheds on the Tarte Pier. Plans, etc., with F. W. Cowie, chief engineer.

Ottawa, Ont.

Tenders addressed to P. E. Ryan, secretary, Commissioners of the Transcontinental Railway, will be received until April 25th for coaling stations, with inclined trestle approaches, for coaling locomotives; ash-pits and cinder hoists at Transcona, Man.; Reditt, Ont., and Graham, Ont. Plans, etc., at office of Gordon Grant, chief engineer, and of S. R. Boulin, district engineer, St. Boniface.

Toronto, Ont.

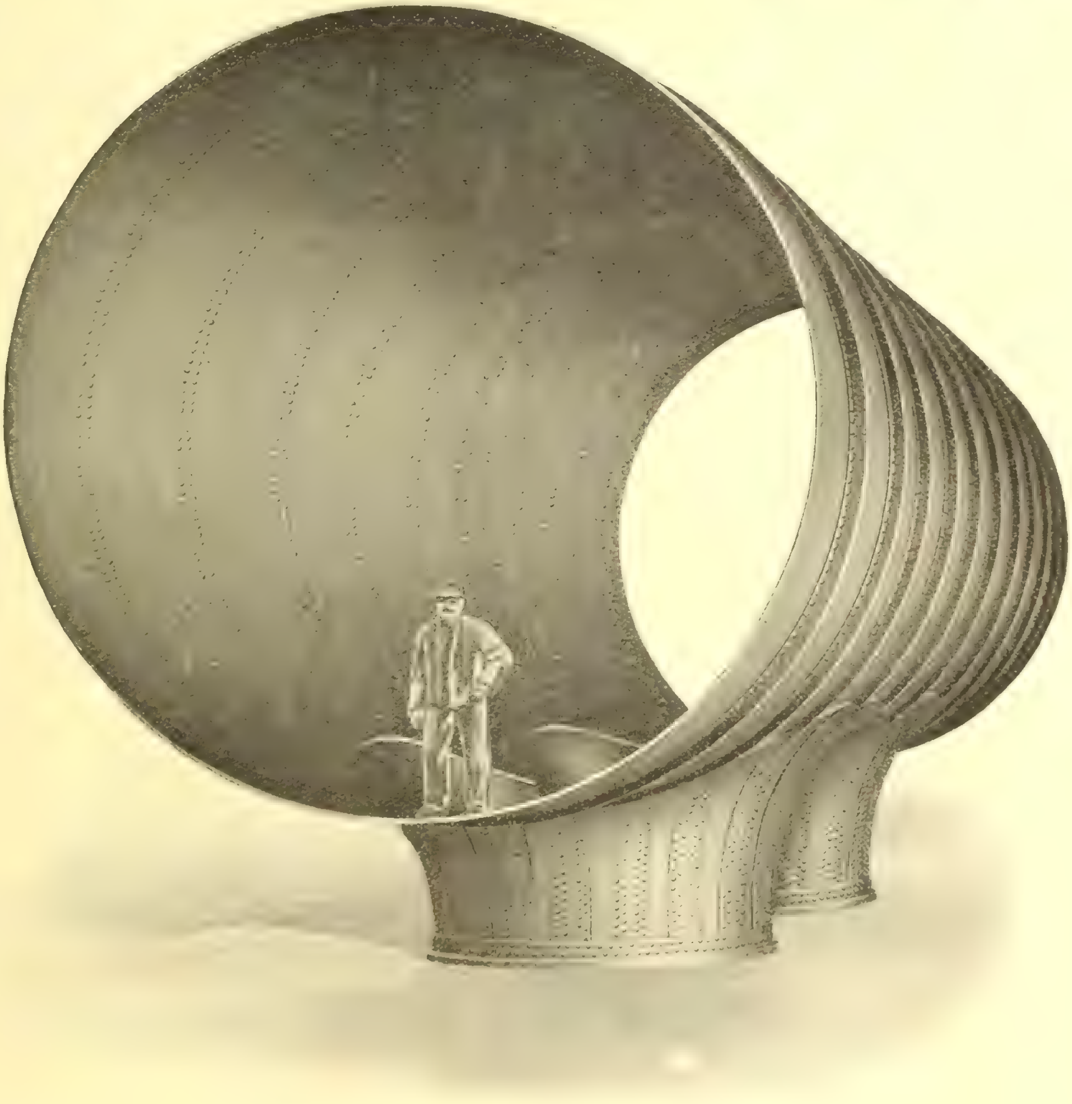
A site has been chosen on Broadview avenue for the new working women's home, and a campaign to raise the required $20,000 started. Mrs. J. B. Leathes, Oriole road, is interested.

Tenders are called until May 9th for the laying of reinforced concrete pipe sewer complete, etc. R. G. Geary, chairman, Board of Control. Advertisement in "Tenders and For Sale Department" of this issue.

Victoria, B.C.

Tenders are called until April 28th for paving with asphalt about forty miles of street. Wm. Northcott, purchasing agent. Angus Smith, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

PENSTOCKS



Side view of Penstock Distributor built for the Ontario Power Co.

We would be glad to hear from those who have Heavy Plate work of any kind to build and especially American Companies who are contemplating the erection of Penstocks or Heavy Plate work of any description in Canada. We are specially equipped for this work.

Write us for particulars

The John Inglis Company Limited

Engineers and Boilermakers

14 Strachan Ave. TORONTO, Canada

RAILWAY CONSTRUCTION PLANT

Hoisting Engines, Horse Powers, Hand Winches, Derricks, Car Wheels, Axles and Boxes, Dump Cars, Rail Cars, Buckets

MARSH & HENTHORN, Limited

Makers of Hoisting Machinery, BELLEVILLE, ONT.

Send for Catalogue

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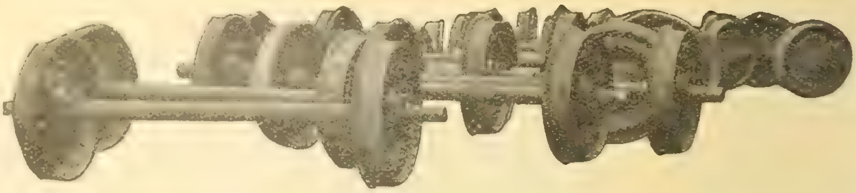
MUSSENS

LIMITED

Montreal, Que.



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For Officers and Employees in positions of trust

BONDS BID AND SUPPLY

In lieu of Certified Cheques, when necessary in Tendering or Contracting for the Furnishing of Supplies.

The

Guarantee Company of North America

THE PIONEER COMPANY *ESTABLISHED 1872*

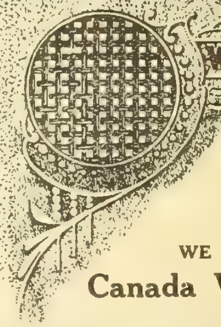
Head Office - Montreal

Capital and Resources over - $1,965,000

Claims Paid over - - $2,265,000

NO CLAIMS IN DISPUTE

This Company is not a party to any premium tariff combination



ORNAMENTAL IRON WORK WIRE CLOTH AND WIRE GOODS

Perforated Metal

Concrete Reinforcement

In Rolls, Lengths or Sheets

WE SOLICIT YOUR ENQUIRIES

Canada Wire Goods Mfg. Co.

HAMILTON, ONT.

Tenders

A few dollars spent in advertising your proposals in

The Contract Record

would result in additional competition, which might save your city or town or your client many hundreds of dollars.

MARSH GAUGES

FOR ALL PRESSURES AND PURPOSES

THE STANDARD FOR ALMOST HALF A CENTURY

PROMPT SHIPMENTS

WRITE FOR OUR PRICES

Gauge and Air Valve Catalogues

Jas. P. Marsh & Co., 224 Washington St. CHICAGO, ILL.

Established 1865

Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

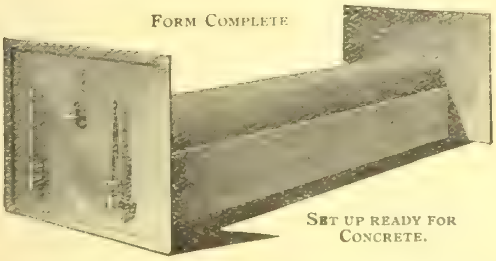
Also Asphalt Mixers

East Iron & Machine Company, Lima, O., U.S.A.

COLLAPSIBLE STEEL FORMS

For the Building of

Culverts, Conduits, Small Bridges, Sewers, Etc.



Our Collapsible Steel Forms are the lightest, strongest and most durable made. They combine in the simplest way every requirement for rapid and practical work, and are attracting wide attention. They are highly endorsed by road and street officials, contractors and engineers everywhere.

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ENGINE CATALOGUE FOR THE ASKING
COMMISSIONER'S TIME BOOK FREE

Concrete Form & Engine Co.

Successor to Collapsible Steel Form Co.

83 Congress St., W., Detroit, Mich.

"Nothing is impossible to pains and patience, but it takes the best material to insure complete satisfaction."

—The Philosopher of Metal Town.

"METALLIC"

Rock Faced and Brick Siding

when in place cannot be distinguished from genuine brick or stone.

An economical, ornamental and durable siding for small houses, automobile garages, office and store fronts, etc.

"Manitoba" Steel Siding

for Elevators, Mills, Storehouses and Factories.

Made from the best quality galvanized or painted sheet steel; it is FIREPROOF and DURABLE, and presents a very neat appearance.

For further information, send for our new catalogue No. 70. Interesting information on Metallic Building Materials.

Manufacturers

1951

The Metallic Roofing Co Limited

TORONTO & WINNIPEG

Neptune Meter Co.

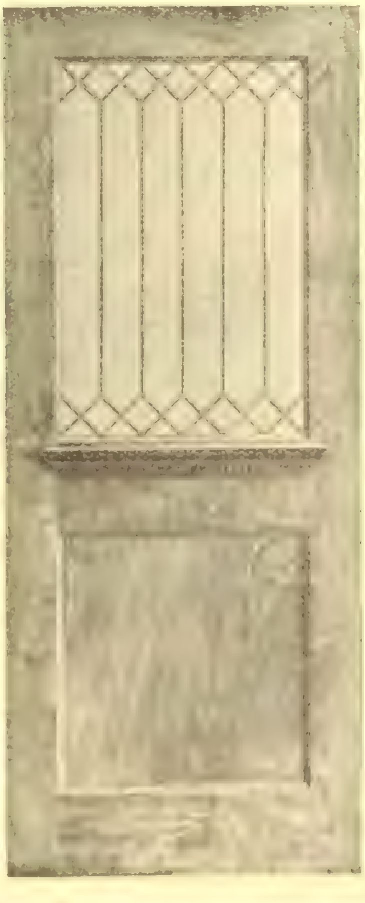
Manufacturers of the well-known

TRIDENT Frost-Proof Water Meters

Write for Catalogue

Main Office - 90 West Street

New York City



Interior Trim, Doors, Stairwork

We are manufacturers of a fine line of Pine and Hardwood finish including interior trim, interior hardwood, pine and veneered doors and stair work.

If you are in the market for any of the above send us your plans and specifications and let us quote.

[illegible]

The

BRYAN

Manufacturing Co.

Limited

Collingwood, Ontario

Every

Luxfer-Prism

is designed to meet a condition and meets it every time

Every architect or contractor who has a lighting problem to solve should recommend "**Luxfer-Prisms**" every time. First expense is last expense except the occasional application of soap and water. When our wrought iron frames are used the side-walks will not warp or sag as with the old system of cast iron frames.

Luxfer-Prism Company, Limited

100 King Street West, TORONTO

Toronto Pressed Brick and Terra Cotta Works

BRICKS

ROOFING AND FLOORING TILES, CRESTING, FINIALS AND CHIMNEY TOPS

Send for Samples and Prices. Special and prompt attention given to Architects' Terra Cotta Drawings

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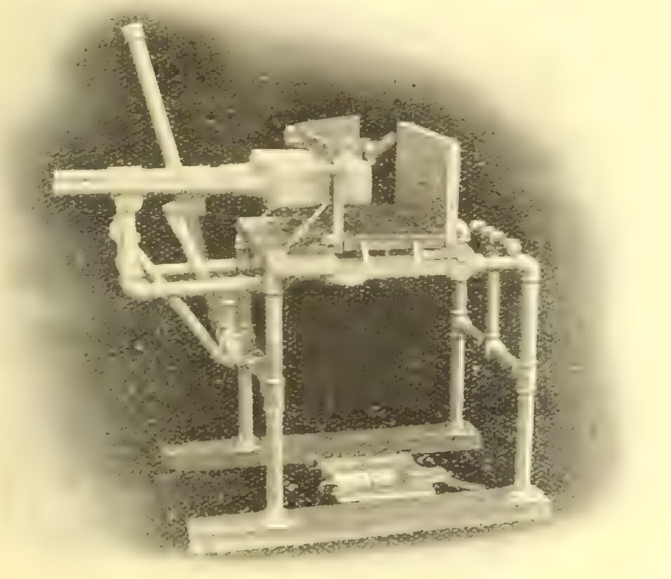
Head Office - - MILTON, ONT.

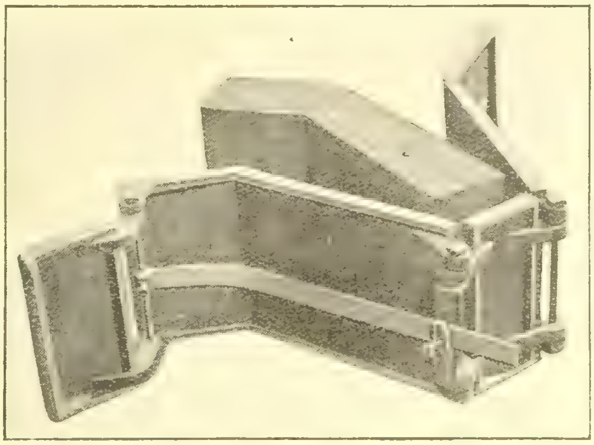
C. J. LEWIS, Proprietor

Montreal Agent: E. F. DARTNELL, 157 St. James St. **Toronto Agent: J. D. MacDONELL, 19 Yonge St. Arcade**



Block Machine No. 1. (End Door Removed)

This machine is strong, simple, and what is more important it is the fastest outfit on the market, and you know time means money.



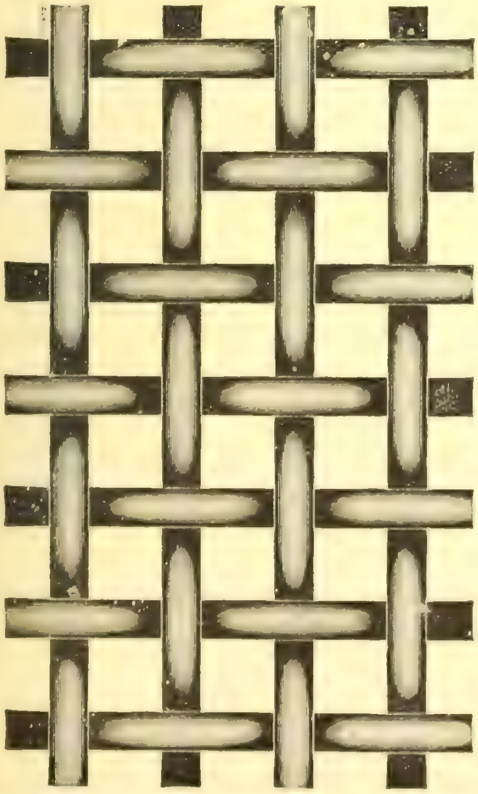
Famous Angle Mould

This mould will make blocks with any angle from 20 to 60 degrees in 8 or 9 inch height without having to change any parts other than for adjustment. A great many of these moulds have been sold.

Send for our Literature

Famous Machinery Co., **21 Pitt Street W.**
WINDSOR, ONT.

Long Satisfactory Service



is the recommendation that sells our sand and gravel screens. We unhesitatingly say that the best and cheapest articles of their kind on the market are

Greening's Sand and Gravel Screens

They have a heavy wooden frame, top and bottom pieces being of dry hard wood. The screen is made of crimped hard steel wire, giving the largest possible screening service. No fine wires to cut, the screen cannot get out of order until completely worn out. And the solidity of their construction causes them to have a longer life than any similar screens with which we are acquainted. Prices are surprisingly low. Standard 2 x 1/4 Mesh in the clear No. 10 wire. Other meshes made to order.

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The B. Greening Wire Co.
Limited

Hamilton, Ont. **Montreal, Que.**

Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

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Sand & Supplies
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'Water-washed' & Gravel

Crushed Granite
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Birch, Mahogany, Plain Oak, Quartered Oak, Cypress, etc.
Sash, Doors, Porch Columns, Store Fronts, Mouldings, etc.

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Manufacturers of Fine Woodwork
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"The best is cheapest"

"Sanorto"
Composition Flooring

Guaranteed durable, jointless, noiseless; fire, water, insect and dust proof
For Churches, Hospitals, Hotels and all public buildings it is unequalled. Its use in private houses for bath rooms, kitchens, verandahs, etc, has always given the greatest satisfaction.
Our imitation marble is perfect. Testimonials on application Estimates on all classes of work free. Distance no object. Write for samples

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EVERYTHING YOU WANT
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Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities
at

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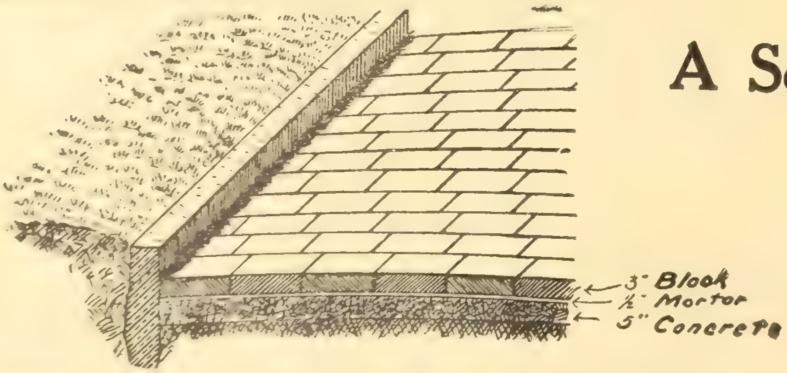

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must be
Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

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Reliable **BRICK MACHINERY** Efficient

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CLAY WORKING PLANT

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3 K.W. Hours on Switchboard for One Cent

No Smell No Noise No Smoke

Suitable for Public and Private Buildings

The Mirrlees-Diesel Crude Oil Engine

uses "Fuel," "Gas" or "Residual" Oil

No Ignition Gear
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No Boiler
Self Contained

Continuous Running
No Breakdown
Cheaper Buildings
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Unskilled Labour only
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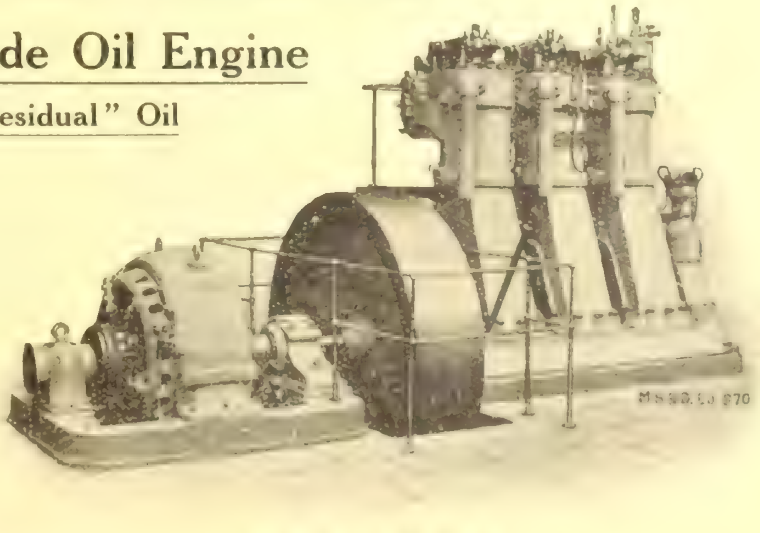

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WHEN YOU THINK OF METAL CEILING THINK OF "GALT"

"Galt" Art Metal Ceilings are sold strictly on their merits, their **mechanical superiority** and faithfulness to art in styles they typify.

Machine-cut beads (patented process) make them easy to apply. Plates snap into place and seams fit snugly together. Why waste your time puttying and peening the joints on old-fashioned stuff when the new is here and costs less?

Write us about your Metal Ceiling work

THE GALT ART METAL CO.,
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KAHN SYSTEM Reinforced Concrete

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FOR
Roofs
Floors, Partitions, Ceilings, Sidings

Eliminates centering in concrete roofs and floors.

Eliminates use of steel studs in partitions.

Eliminates small channels, tees and angles in ceilings.

Eliminates centering studs and special equipment in sidings.

It Effects a Saving Every Time

Trussed Concrete Steel Co.
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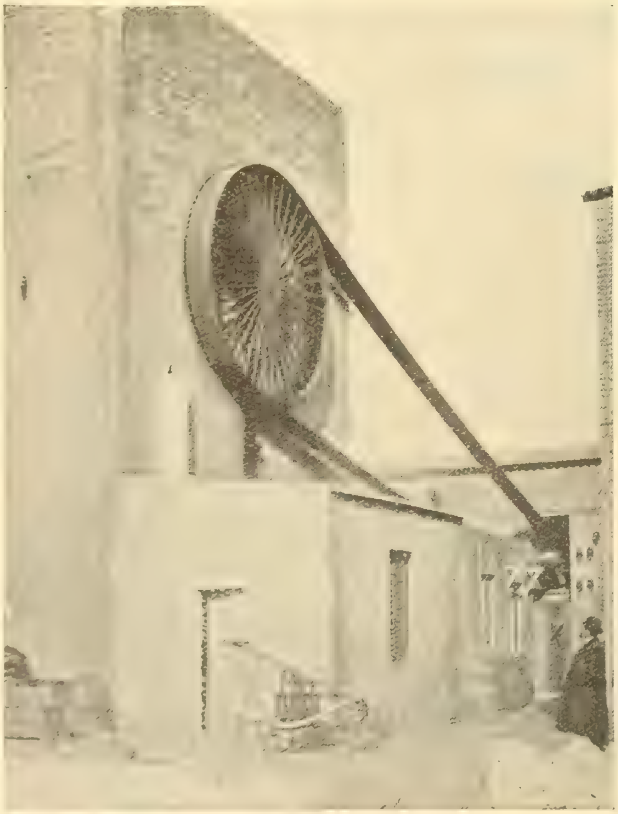

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Good for

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Federal Engineering & Supplies
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Face Down Blocks

Blocks 4″, 6″, 8″, 10″, 12″, 16″ and 20″ long.
4″, 6″, 8″, 10″ and 12″ wide
All Blocks on One-size Pallet.

Sold in combination to suit purchaser at reasonable prices

Guaranteed against defective material or poor workmanship.

Our catalogue R. with full information and prices on request.

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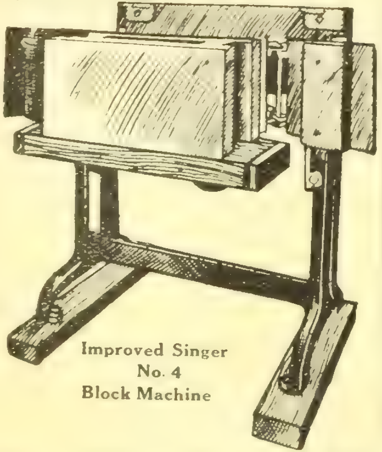
Niagara Falls, Ont.



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Block Machine

ENGINES and BOILERS of all types and sizes, Heaters, Tanks, Pumps etc

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Built in the best manner and of material that can be depended upon. They will be found to fully sustain the high reputation of

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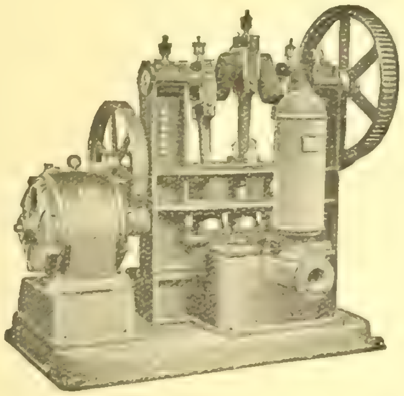

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Inspection and Tests of Steel, Iron and Cement
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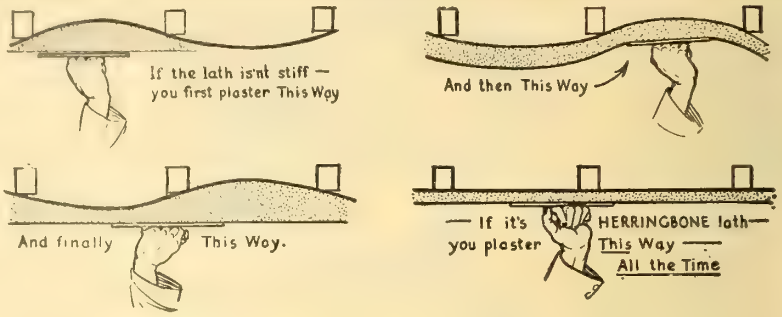
Another Reason for Herringbone Popularity:

Because Herringbone Requires The Least Plaster

STUDY THIS PICTURE ☛

Herringbone—the ribbed lath—is the stiffest made. A plasterer who had contracted to plaster Herringbone lath was [illegible] compelled to work on another house. He sued for damages, submitting cost accounts as evidence. He won.
Must your profit and loss account sue YOU for damages?


If the lath is'nt stiff — you first plaster This Way
And then This Way
And finally This Way.
— If it's you plaster
HERRINGBONE lath— This Way — All the Time

CLARENCE W. NOBLE, - 117 Home Life Building, Toronto, Ont.

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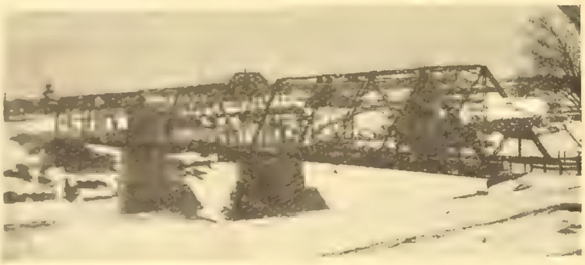
THE METAL SHINGLE & SIDING CO., MANUFACTURERS

Steel Bridges
and Concrete Work



For over a quarter of a century we have been building Steel Highway Bridges throughout Canada.

Our experience is at your disposal.

We also manufacture Standpipes and Elevated Tanks, Steel Piling, Boilers, etc.

Get our figures before closing your contracts.

The Hunter Bridge & Boiler Co., Ltd.
Kincardine, - Ontario.

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When an Architect specifies Satinette he desires to enhance and protect the beauty of his design

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"Satinette"—the enamel that never turns yellow—is the most perfect and durable white enamel ever made.

"Satinette"—is suited for decorative work of every description—Gloss Interior and Flat Interior for interior work and Gloss Exterior for all exterior work.

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"Satinette"—makes an artistic, durable and Sanitary covering for house decoration.

Like all standard products "Satinette is the result of **much thought** and **experience and is now the most popular enamel finish** on the market.

All Standard Products are sold in full Imperial Measure Cans and manufactured by

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TORONTO WINNIPEG

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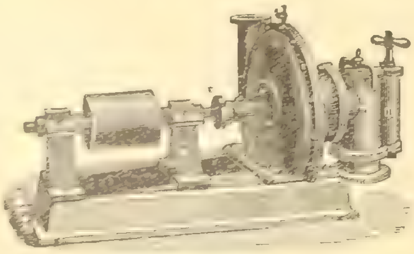
Welland, Ontario, Canada

Dredges, Ditchers, Derricks, Steam Shovels



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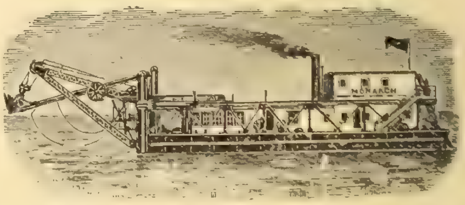
Submarine Rock Drilling Machinery
Mine Hoists, Hoisting Engines
Centrifugal Pumps, Clam Buckets
Steel Skips, Coal and Concrete Tubs
and other Contractors' Machinery.



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Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.

Sizes 3 to 42″ Diameter up to ¼″ in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

Write for our Catalogue 5 4 and prices on your requirements

AMERICAN SPIRAL PIPE WORKS - MAIN OFFICE—CHICAGO
NEW YORK OFFICE 50 Church Street

55,000 cu. yds. of Concrete

placed in the foundation of the Municipal Building, New York City.

Doud's "Acme" Center Dump Bucket

used on this construction.

This bucket gave complete satisfaction.

(Extract from letter referring to above.) "Your bucket in every way has given perfect satisfaction; it is all that the word 'Acme' implies; in my eighteen years experience I have used no better."

W. S. Downing,
(Signed)
Supt. Construction
The Foundation Co

Load deposited perfectly central. Dumps into wagons, hoppers and forms with the same exactness

They always give satisfaction

Patented April 5, 1910

Write for Catalog—Ask about our new Patent Concrete Cart

The Acme Equipment & Engineering Co.
1032 Garfield Building, CLEVELAND, OHIO
SELLING AGENTS
The Dominion Equipment & Supply Co., Winnipeg, Canada

Are You Interested in Concrete Construction?

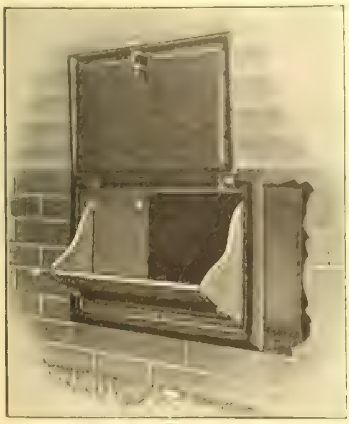
The latest method in this work for making concrete tougher waterproof and a better color is to incorporate in your mixture

Guelph Hydrated Lime

This lime is very fine and fills all voids. It also prevents the concrete from drying too rapidly.

Specify GUELPH HYDRATED LIME for your next job, it's the coming thing for use with cement

Standard White Lime Co.
Guelph - Ontario



Majestic Chute Open

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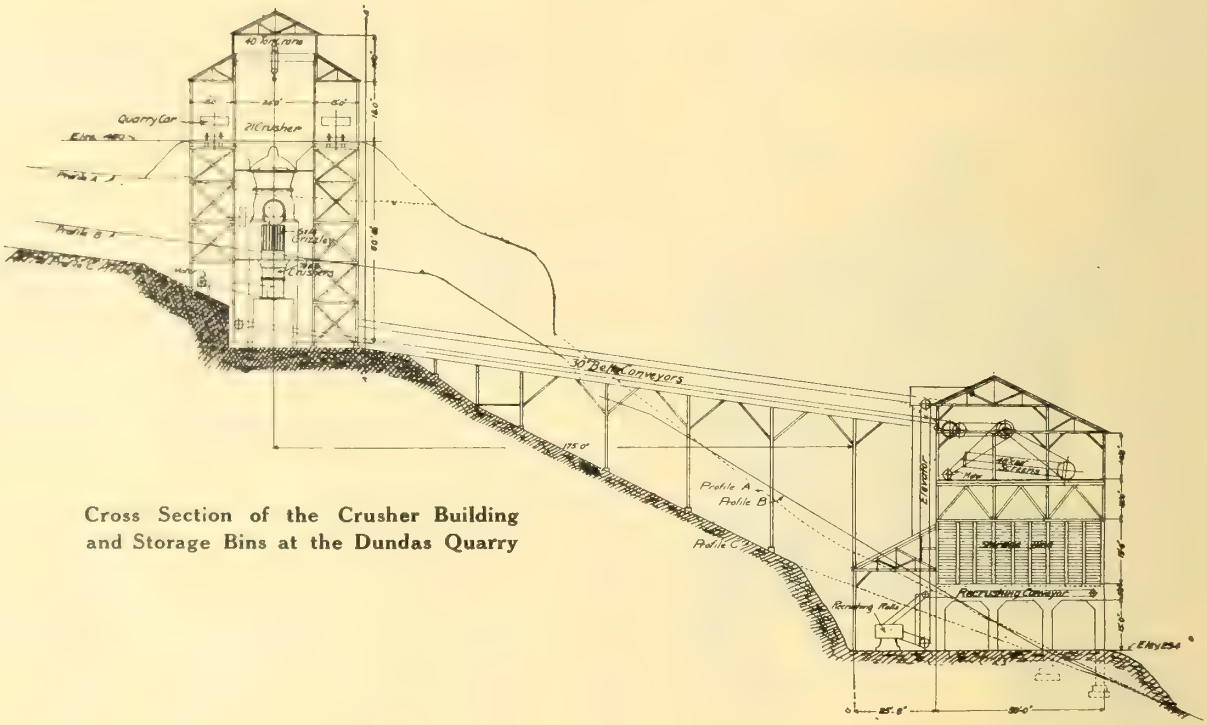

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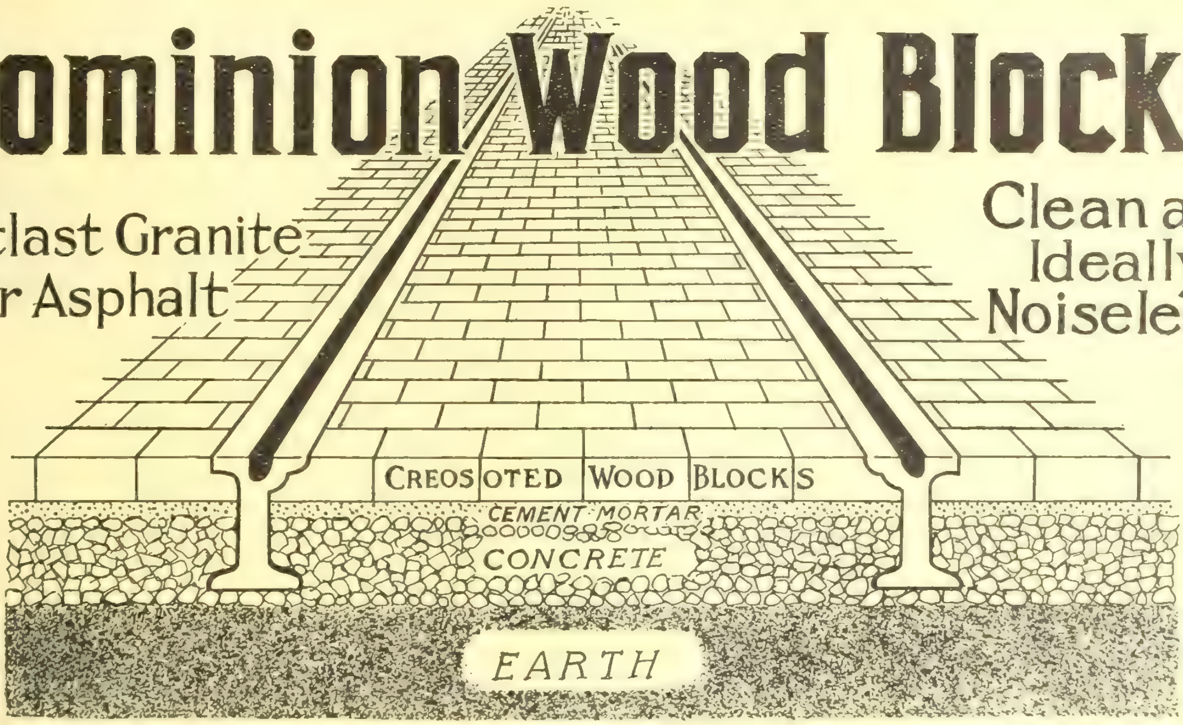

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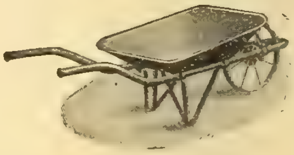

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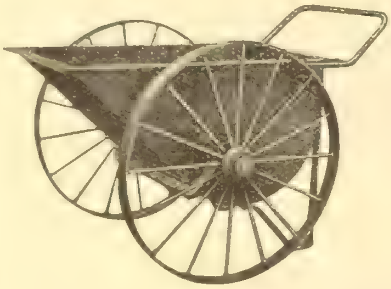

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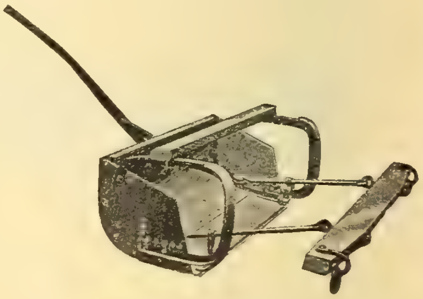

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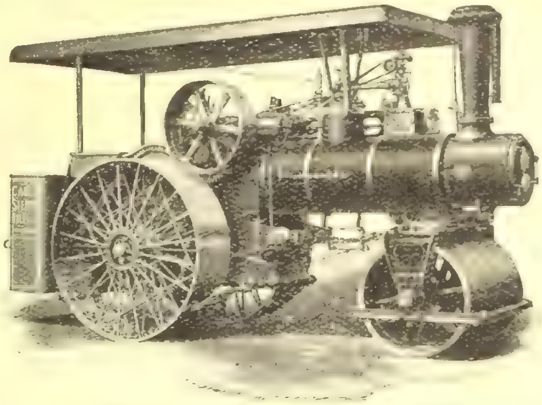

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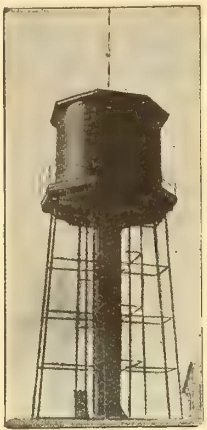

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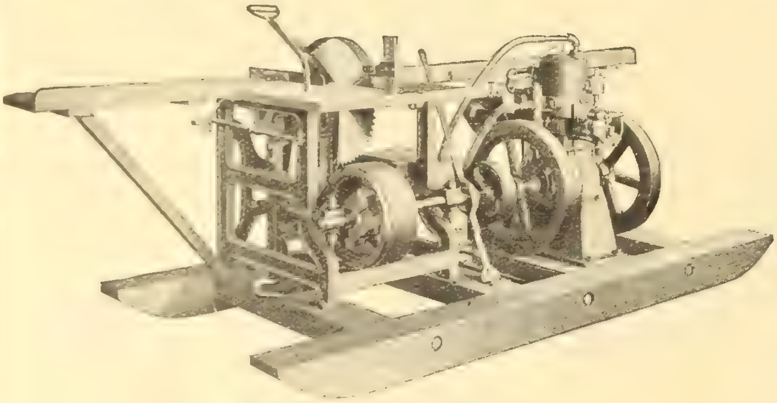

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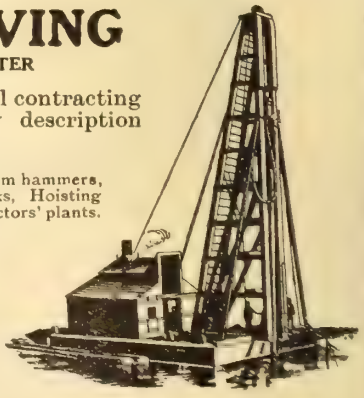

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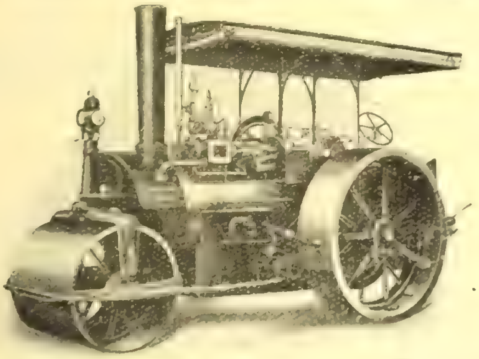

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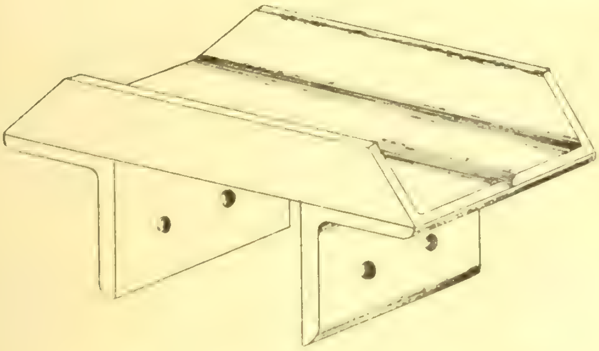

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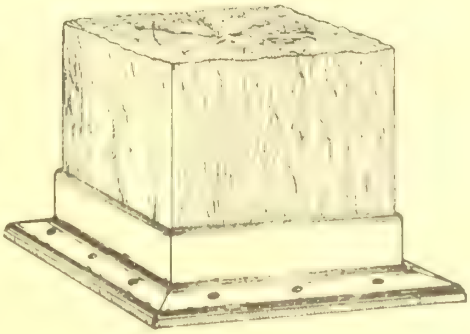

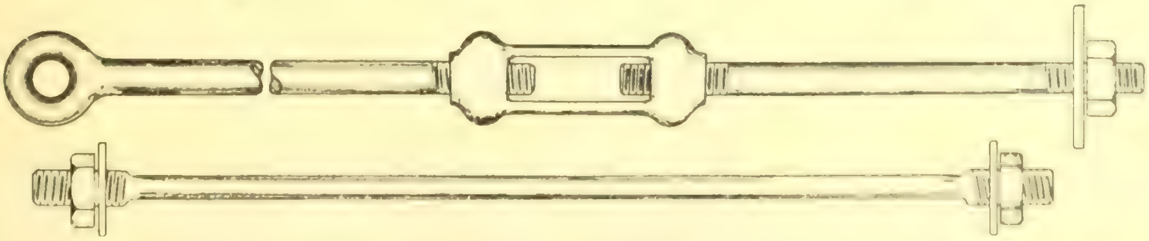

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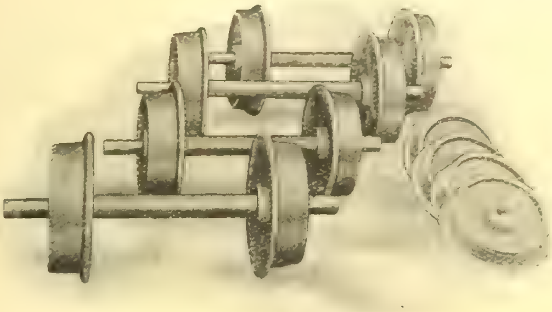

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The following are wholesale prices delivered at Toronto:—

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No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work....	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

		Star.	D.D.
10 to 25	united inches......	$4.25	$ 6.25
26 to 40	"	4.65	6.75
41 to 50	"	5.10	7.50
51 to 60	"	5.35	8.50
61 to 70	"	5.75	9.75
71 to 80	"	6.25	11.00
81 to 85	"	7.00	12.50
86 to 90	"	...	15.00
91 to 95	"	...	17.50
	Brass Goods, Valves, etc.		
96 to 100	"	...	20.50
101 to 105	"	...	24.00
106 to 110	"	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES.

(Installed in Toronto.)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—½-inch square, 65 cents.

Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

Vitreous Tile—All sizes, according to color, 55 to 65 cents.

Glazed—White, 6 x 8 inches, 55 cents per square foot.

Matt—Dull finish colors, first, 70 cents.

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Opalite Tile—3-16 inch No. 1 standard, size 6 x 3 inches, 6 x 2 inches, 60 cents.

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High grade compression work, 60 per cent.

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No. 4 compression bath cock ....net	$1.65
No. 4½ Fuller's ....net	2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range.

30-gallon, standard, $4.50; extra heavy, $7.00.

Cast Iron Sinks.

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe.

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 50 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

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Medium and extra heavy pipe and fittings, up to 6-inch, 75 per cent.

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Cement, wholesale, car lots, f.o.b. Toronto, bags extra, $1.70.

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Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

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Rubble stone in car lots, $1.30 per ton.

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Plaster of Paris, per barrel, delivered, $2.20.

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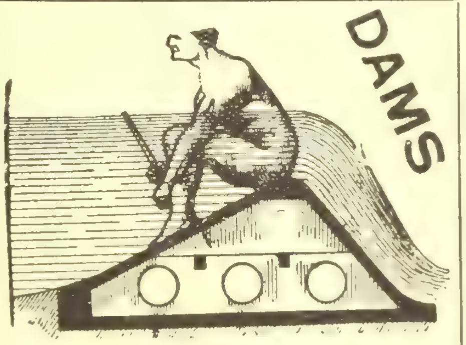

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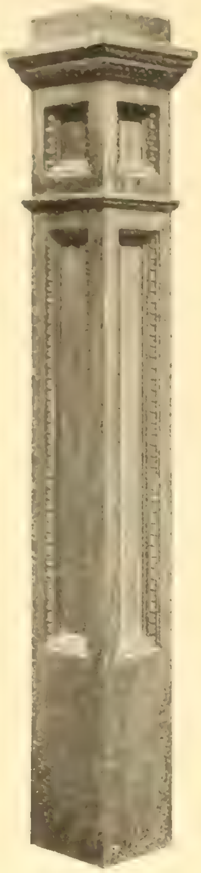

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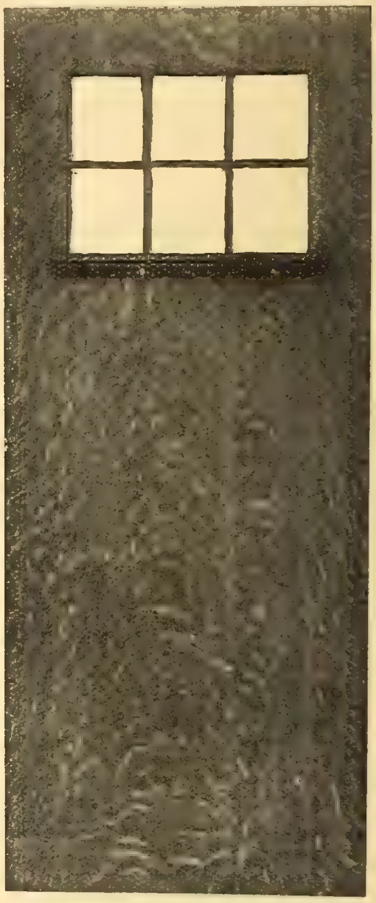

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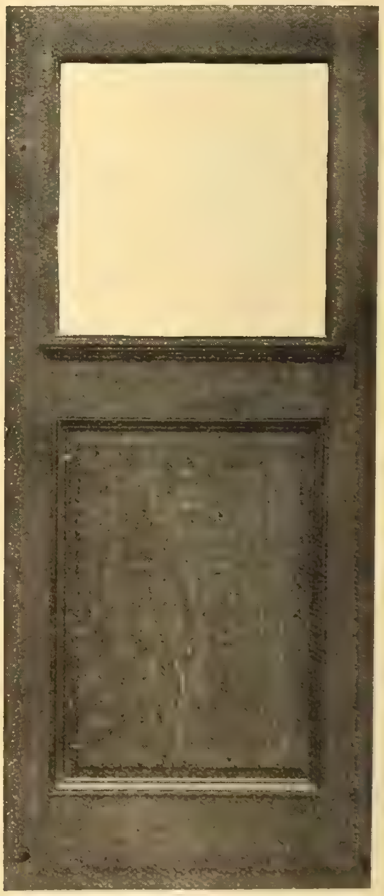

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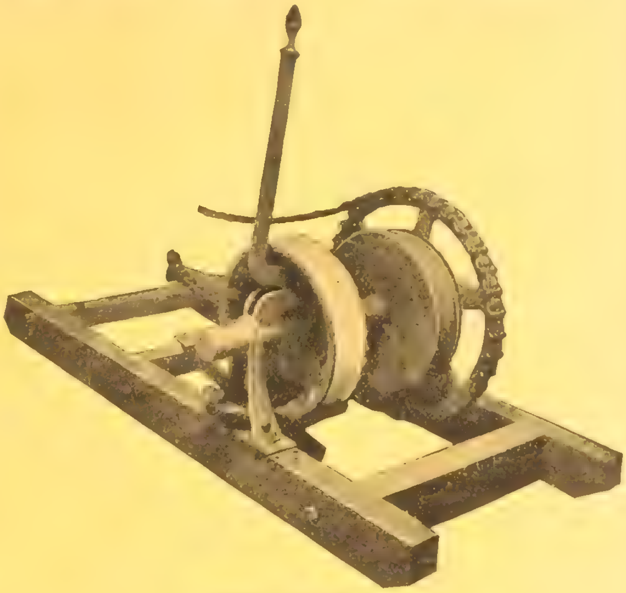

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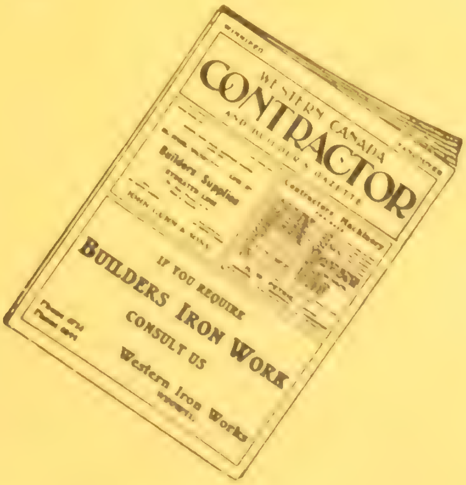

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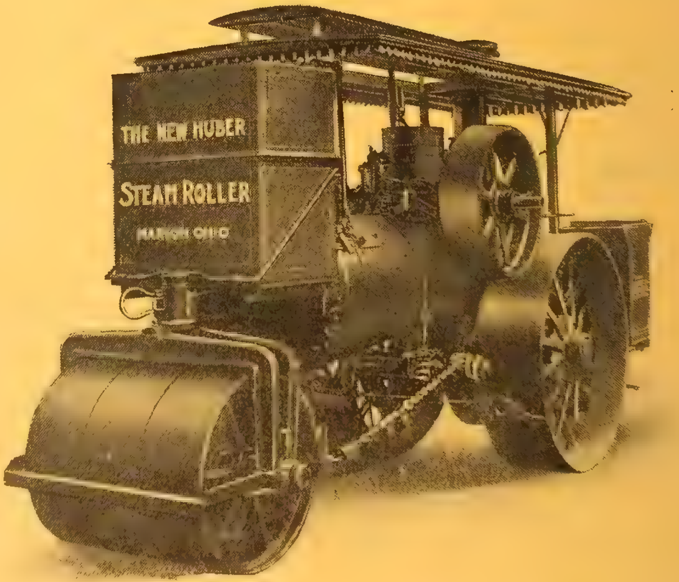

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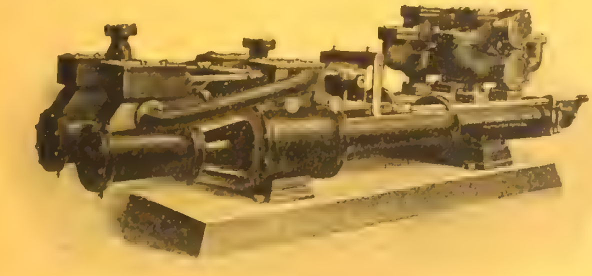

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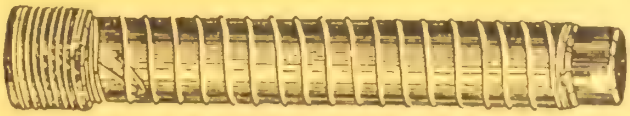

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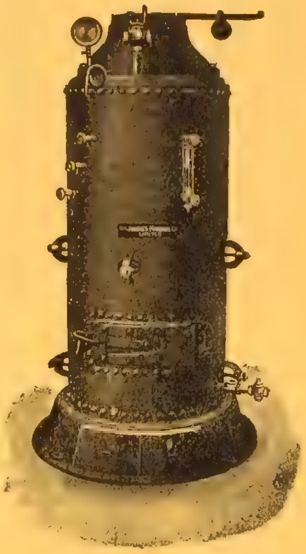

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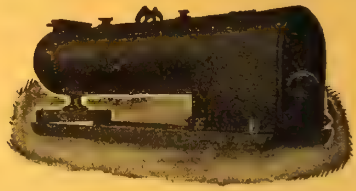

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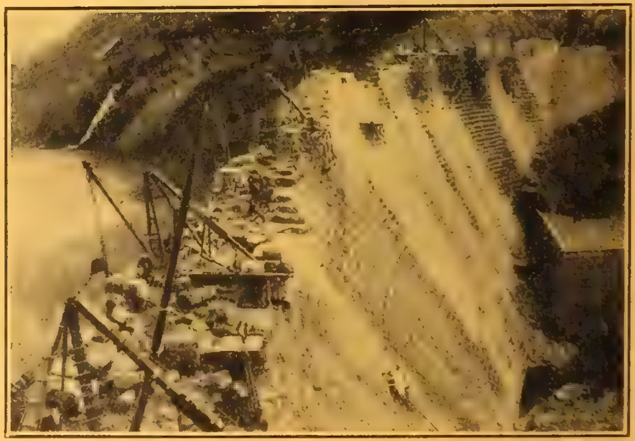

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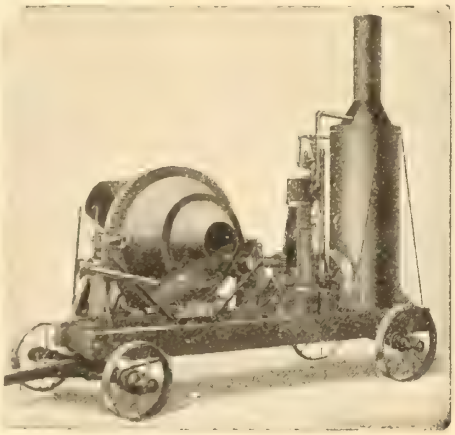

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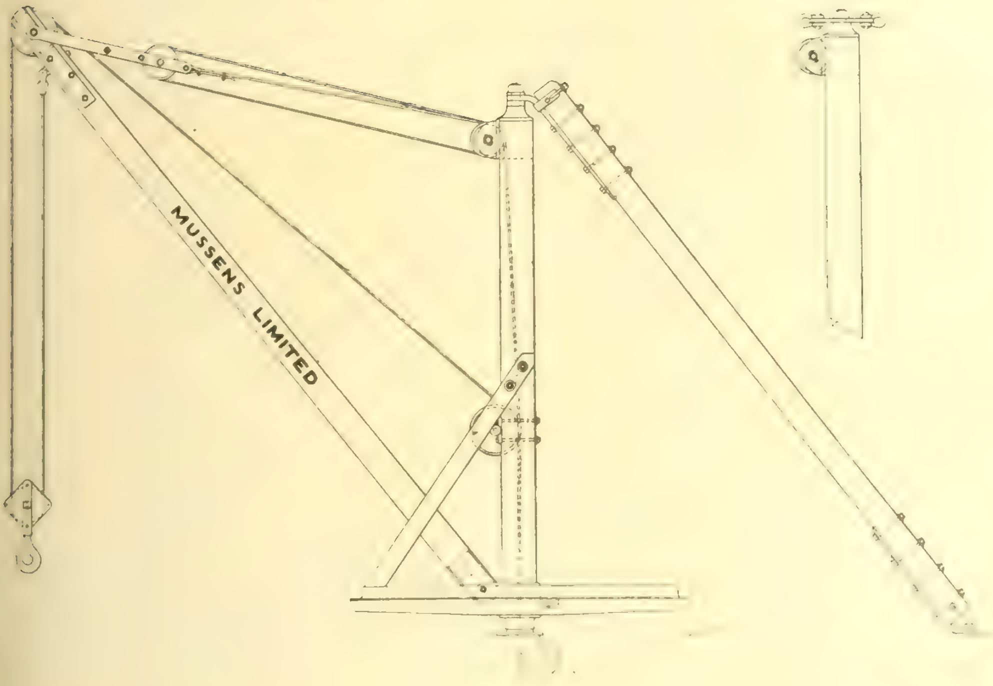

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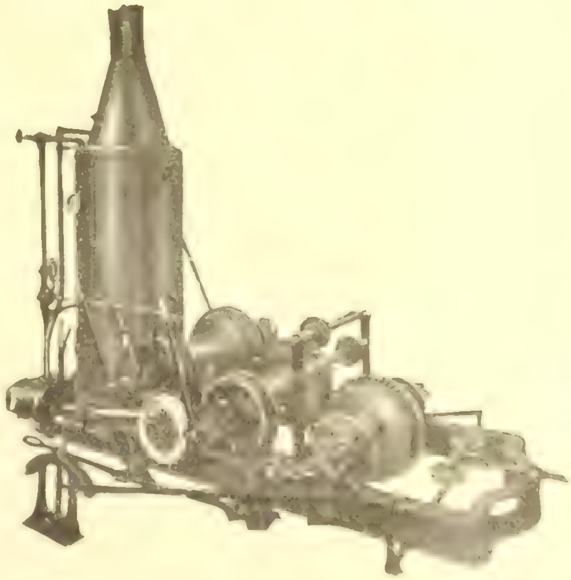

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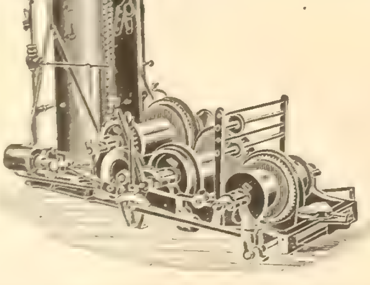

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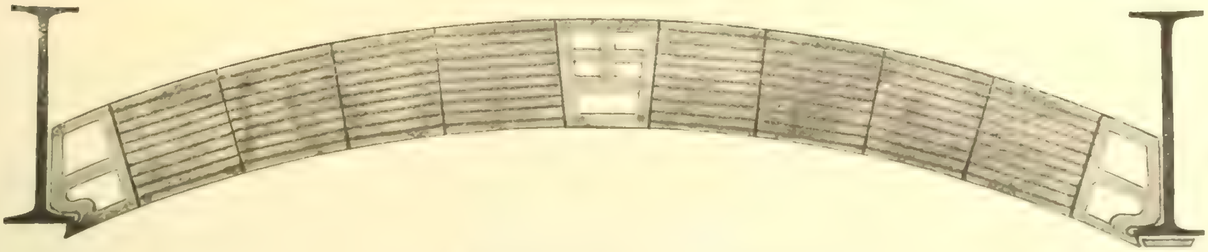

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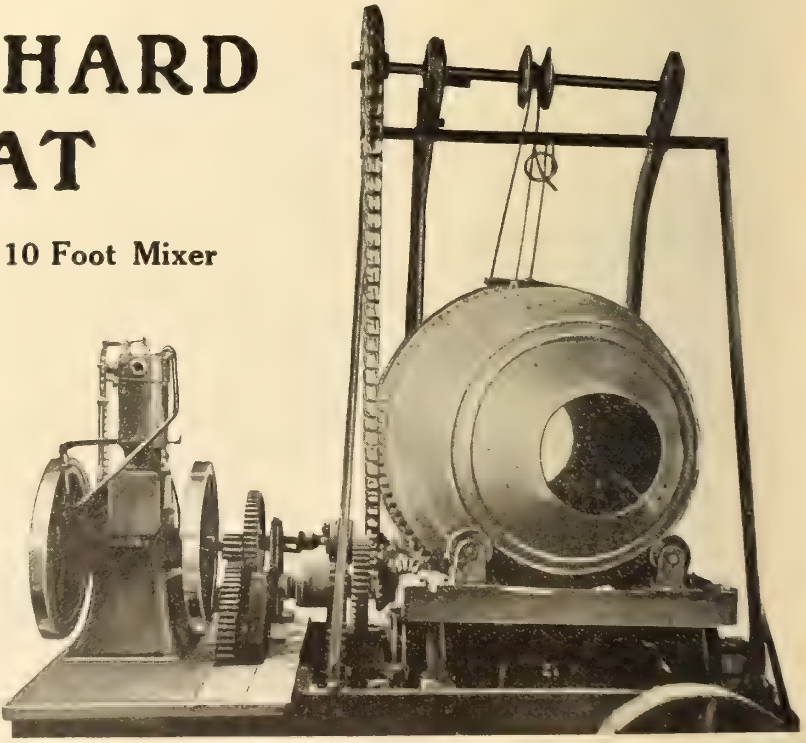

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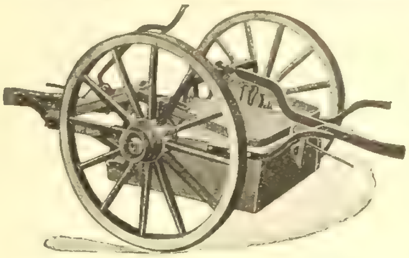

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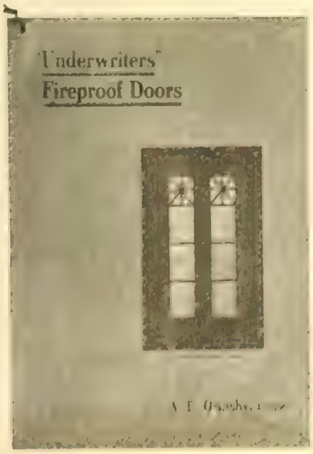

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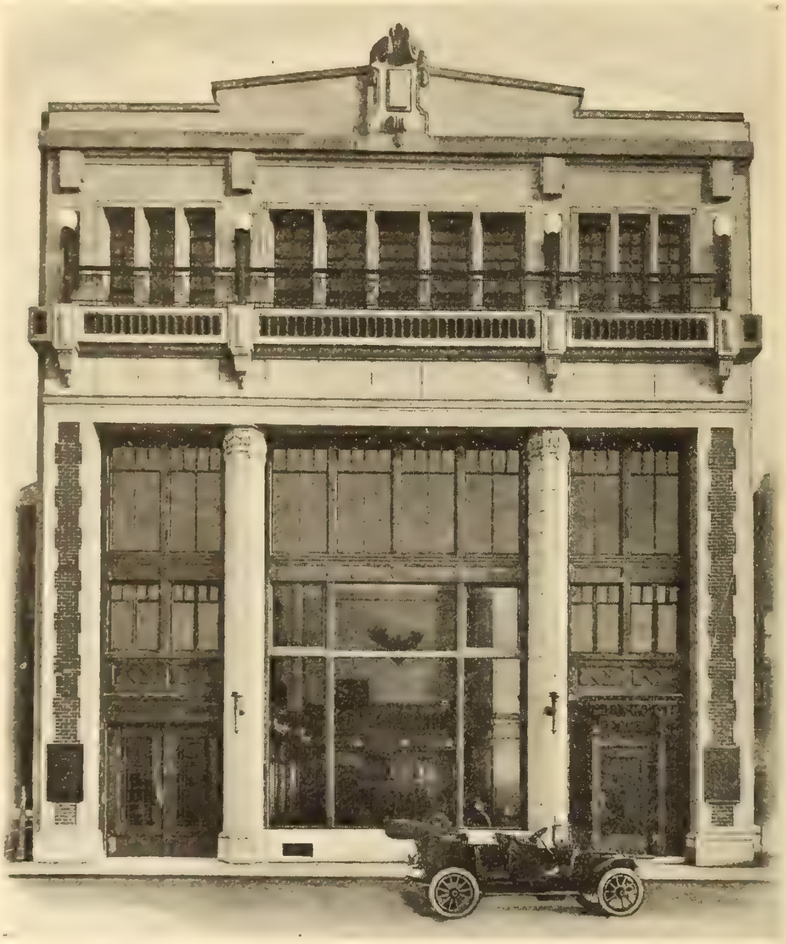

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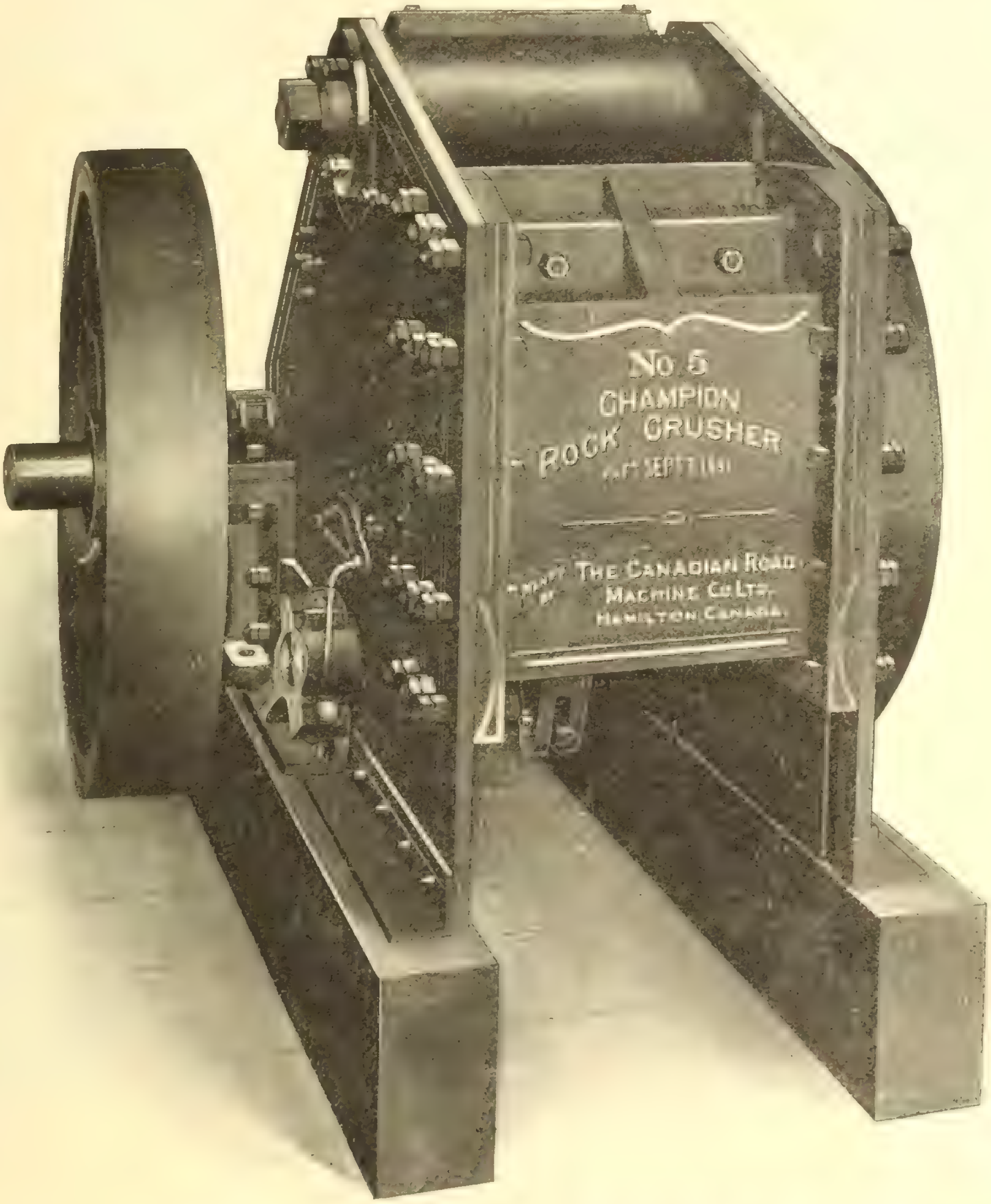

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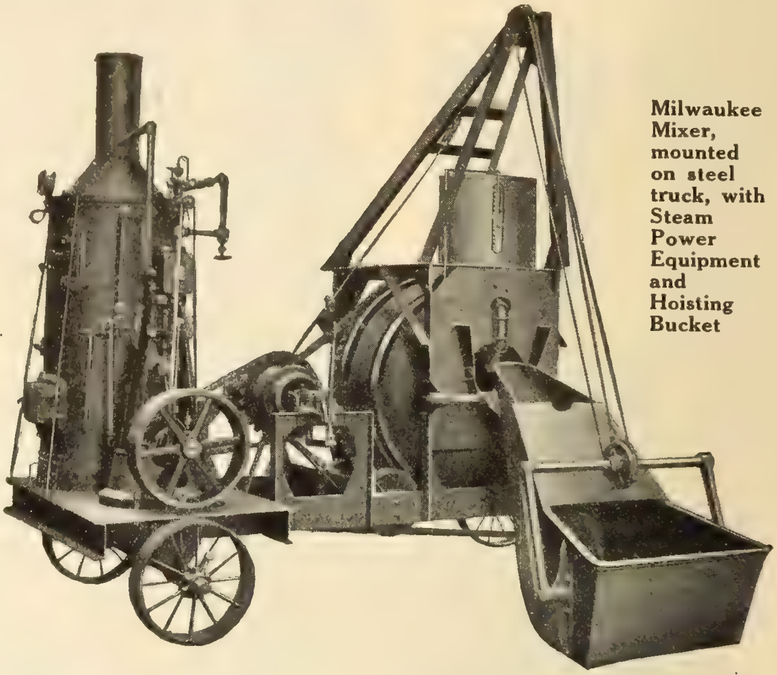

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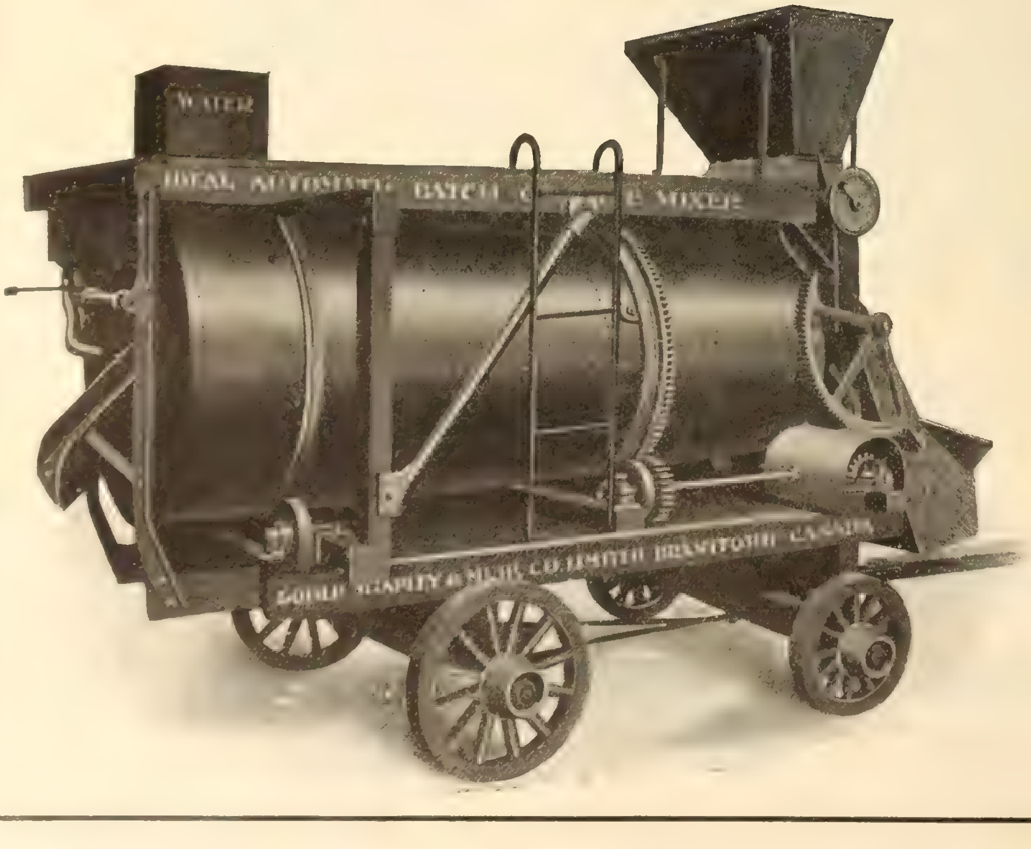
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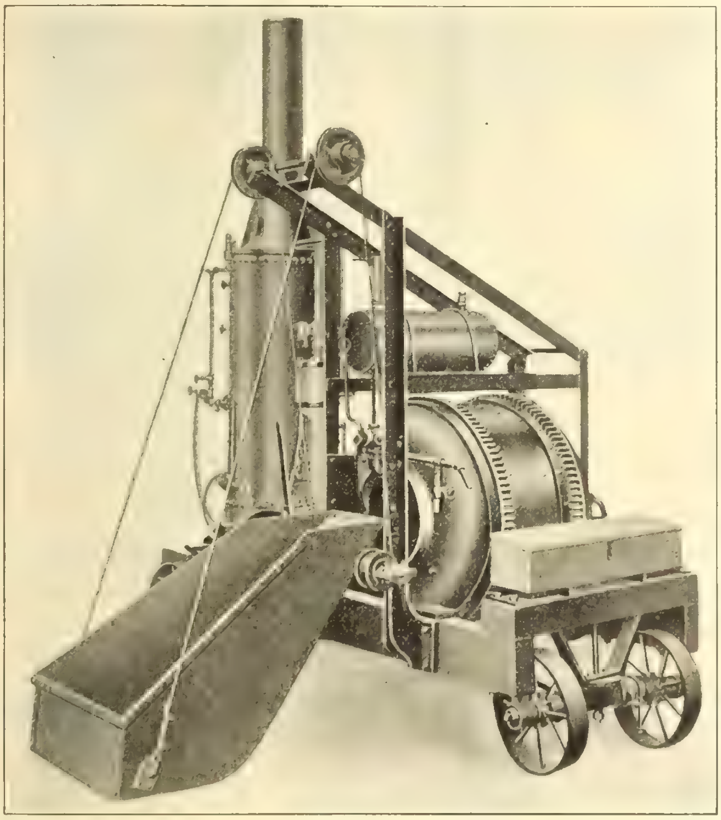

Concrete Mixer theories grow into definite mixing knowledge when every mixing action is a known positive mechanical force.

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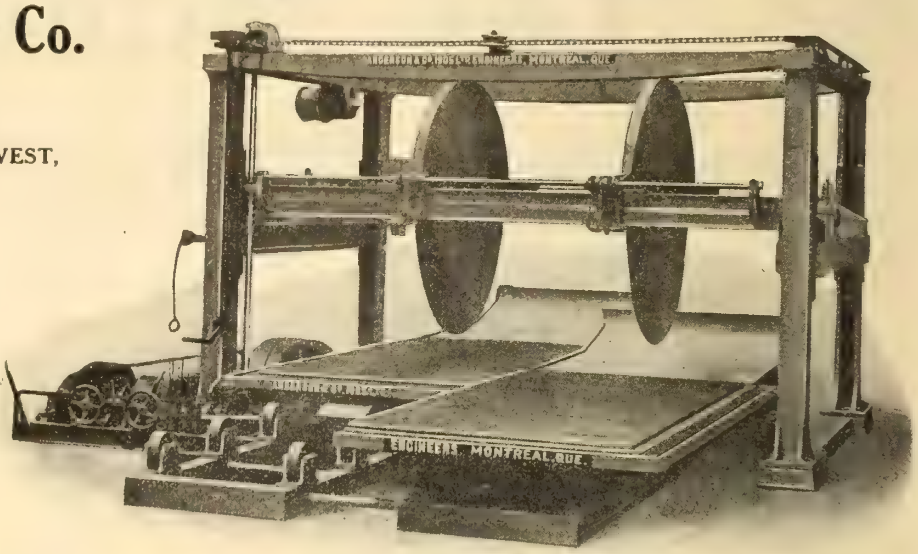

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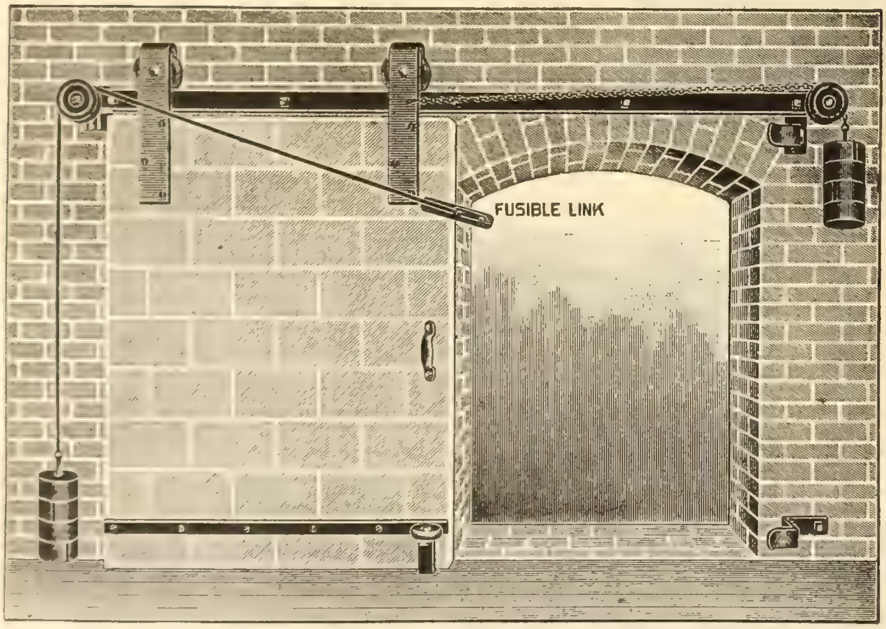

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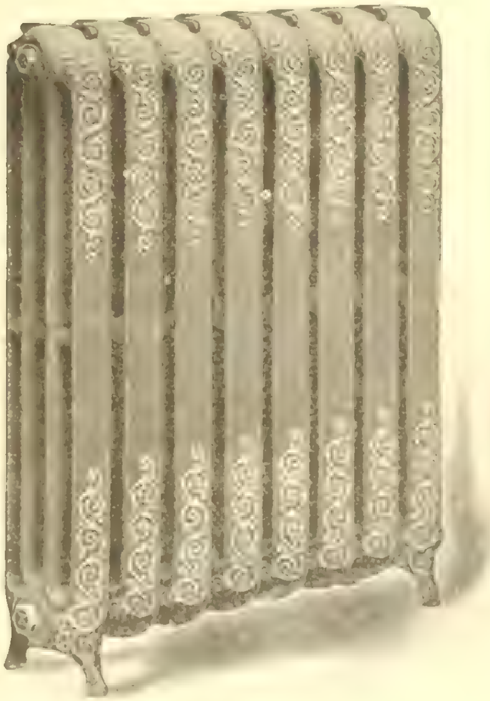

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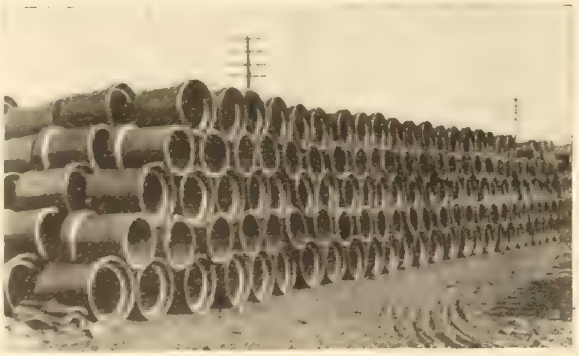
The Hamilton & Toronto Sewer Pipe Co. Limited

HAMILTON and TORONTO

We are not the Largest Manufacturers OF SEWER PIPE IN THE WORLD

The Row of Fame is a Row of VITRIFIED PIPE



18 inch Double Strength

We Have Many Rows Like This In MIMICO

Sizes 4 in. to 24 in. in any desired quantity

and we have not been at it for Fifty Years either.

Look at our Pipe

and then tell us if it is necessary for us to make those boasts before we modestly admit that we hold first mortgage on the title of BEST.

ARE YOU FROM MISSOURI ?

Then we can produce to your satisfaction if you give us the opportunity.

MIMICO PIPE

may be equalled, we admit, but it's more than a day's journey to find a better.

The ONTARIO SEWER PIPE COMPANY, Limited

MIMICO, ONTARIO

Telephones, Toronto Connection, Park 422, Evenings Park 3888 and 3889

Sewer and Culvert **Pipes**

We manufacture Highly Glazed and perfectly Vitrified "Standard" and "Double Strength" Sewer Pipes and make a specialty of Double Strength Pipes for Railway Culverts.

We also manufacture Smoke Jacks, Inverts, Wall Coping, Flue Linings (square and round), Chimney Tops, Hollow Building Blocks and all kinds of Vitrified goods.

Fire Clay Goods, Stove and Range Bricks, Boiler Tube Bricks, Locomotive Blocks, and all kinds of "Special Shapes."

The
Standard Drain Pipe Co.
of St. Johns, P. Q., Limited
Factories at
St. John, P. Q. and New Glasgow, N. S.

THE REMEDY
FOR THAT HOT AND STIFLING ROOM
IS A
Sturtevant
Electric Propeller Fan

¶ They increase output, reduce sick leave, and raise efficiency of workers by keeping the air fresh and cool

¶ Easily and cheaply installed, the first cost is small.

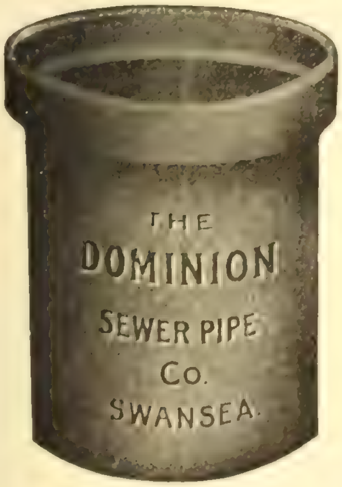
¶ The scientific design and construction of fan blades makes possible the moving of immense volumes of air at small expenditure of power.

¶ These fans are invaluable for use in workrooms, offices, kitchens, billiard halls, and in all places where heat, smoke or fumes are to be removed.

¶ Our engineering staff are always ready to make suggestions if you will inform us of the conditions to be met, the size of the room, etc.

B. F. STURTEVANT COMPANY
HYDE PARK, MASS.
Offices within calling distance from all large centers 859

SWANSEA
Salt Glazed and Vitrified
SEWER PIPES



True to Size.
Impervious to Water.
Sizes manufactured and always in stock 4 in. to 24 in.

Ask for Price List and Discounts.

also
Chimney Tops
Flue Linings
Wall Coping
Culvert Pipe
Inverts

TELEPHONE (Toronto Connection
PARK 1809

The Dominion Sewer Pipe Co.
(The Independent Co.) Limited
SWANSEA (near Toronto)

American
Sewer Pipe Co.
General Offices: Akron, Ohio, U.S.A.

We can serve you best. Our prices are right. The quality of our goods is of the highest excellence We are the largest manufacturers of **Vitrified Salt Glazed Sanitary Sewer Pipe** in the world. Sizes, 3 in., 4 in., 5 in., 6 in., 8 in., 9 in., 10 in., 12 in., 15 in., 18 in., 20 in., 22 in., 24 in., 27 in., 30 in., 33 in., 36 in., 42 in. Lengths, 2 to 3 ft. Socket, Standard or Deep and Wide. Thickness in sizes 15 in., to 42 in., both Standard and Double Strength; We also manufacture Flue Lining, Wall Coping, Vitrified Conduit, Vitrified Curb, Paving Blocks, Drain Tile, etc.

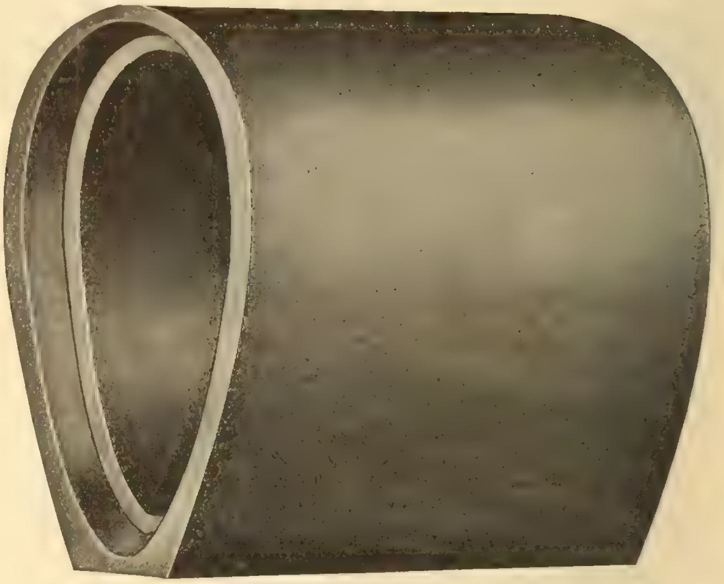
Send for Catalogue.

201 Devonshire St., Boston, Mass.

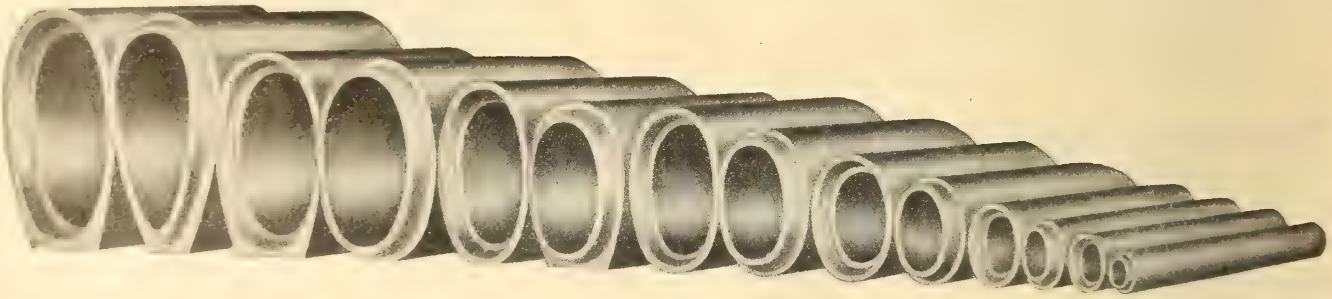
Municipal Engineers and Contractors

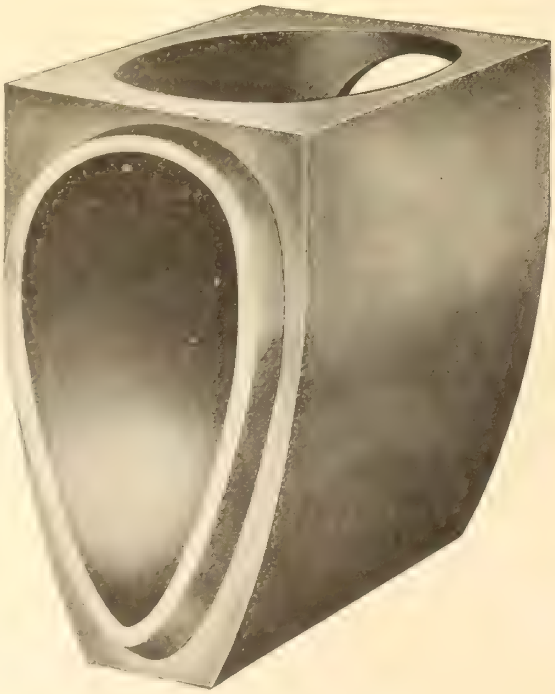
For **sewers** the only everlasting pipe is **concrete.** Builders do not use brick in foundations. Why? Because of the moisture. They do use concrete. Why? Because it is a proof against the destructive tendency of moisture. Why continue to use brick for sewers when a better material is now available at as low a cost?

In **Duluth** brick sewers failed after seven years so as to require replacement. **Concrete** sewers put in at the same time are **intact.** In **Millwaukee** after 25 years concrete pipe was found better than when new. Of 300 miles of sewers in **Millwaukee** over 200 miles are of **concrete.**



Section of 2′ x 3′ pipe





Man-hole Section of 2′ x 3′ pipe

Concrete sewers abound in **England** and **Germany**. The modern **sewers** of **Paris** are all of **concrete**. American cities have adopted it. **Brooklyn** has hundreds of miles of it with not a single failure, whereas even Scotch vitrified pipe has been found to have deplorably failed there. **Toronto,** after much hesitation, is now in line with concrete. Why be the last to join the ranks you eventually will and must join?

Our circular and egg-shapped sewer pipe are unsurpassed in quality, are more easily laid than flanged pipe, and give no trouble or ridiculous expense over man-holes or connections.

We have replaced vitrified pipe with concrete pipe and have found over 50 per cent of the vitrified unfit for re-laying. We carry a large and mature stock, we guarantee the quality, we take care of breakage in transit, and we solicit your patronage.

WRITE FOR CATALOGUE PRICE

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KEMPTVILLE, ONTARIO

STEEL BARS for Reinforcing Concrete

The Steel Company of Canada

HAMILTON TORONTO MONTREAL Limited

Plain Rounds and Squares

Cold Twisted Squares

Maxwell Deformed Bar

Write nearest office for quotations

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LOW PRESSURE TURBINES

ANY OUTPUT

ESCHER WYSS & CO.

Water Power Engineers

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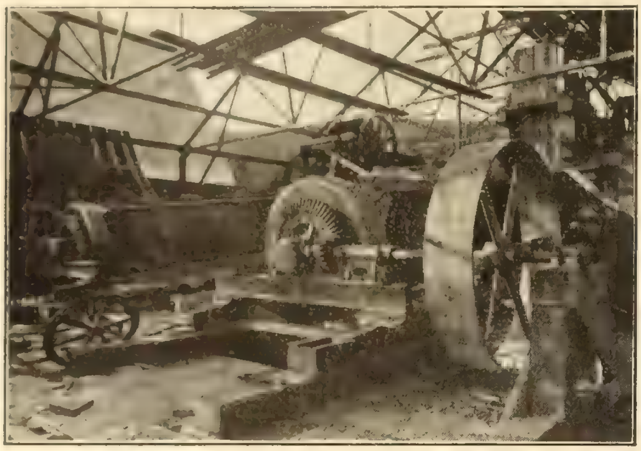
Notable Crushing Plant

DESIGNED AND ERECTED BY US

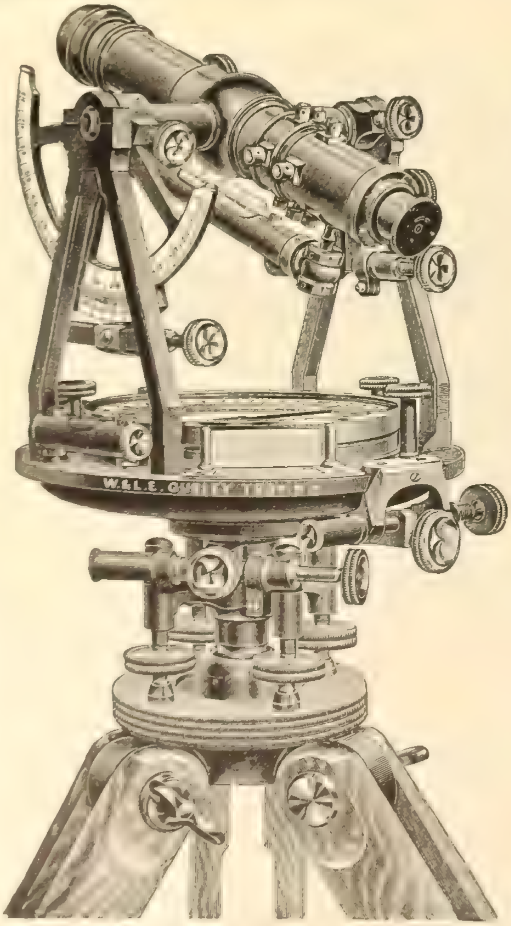


Screens 6 ft. x 22 ft. with 2¼ in. openings
(during construction)

View No. 5

This view in Laurin and Leitch's crushing plant, Montreal, should be studied in connection with the view shown on March 15th, and that in the next issue. The fines are elevated to storage bins. The oversize drop into the coarse rock bin, which feeds 4 No. 6 crushers, shown in next issue. Send to sales offices, Montreal, Toronto, Cobalt, Winnipeg, Calgara, Vancouver, for photos and bulletins regarding the largest crusher in Canada.

Allis - Chalmers - Bullock
LIMITED



1845 1911

W. & L. E. Gurley

TROY, N. Y.

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Field Instruments

for Civil, Mining and Hydraulic
Engineers and Land Surveyors

- Transits
- Y Levels
- Compasses
- Plane Tables
- Current Meters
- Levelling Rods
- Chains
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Also Makers of

Physical and Scientific Laboratory Apparatus
Standard Weights and Measures
Accurate Mercurial Thermometers

Branch Factory: Manufacturers Exchange Building Seattle, Wash.

Latest edition of Gurley's Manual sent on Application.

Asbestos Cement Shingles

FIREPROOF, WATERPROOF AND EVERLASTING

The above illustration shows the application of the Asbestos-Cement Shingles laid in the so-called American method, employing an 8″ x 16″ Shingle, 7″ to the weather.

We would call special attention to the use of our **Asbestos Building Lumber** used in place of Stucco with battins, producing the English half timber effect. The **Asbestos Building Lumber** is manufactured in sheets 42″ x 48″ and 42″ x 96″. One especially favorable feature in connection with the use of this material is the possibility of its application at any season of the year. Your building need not be delayed in the winter on account of frosty weather. The sheets are made in thicknesses ranging from 1/8″ to 5/8″, the 3/16″ being recommended for work of this character.

Asbestos Manufacturing Co., Limited

705 Eastern Townships Bank Building, MONTREAL, P. Q.
Factory at Lachine, P. Q.

We manufacture Air Cell Pipe Covering, Asbestos Paper, Millboard etc.—in fact we make everything in the Asbestos Line.

C. P. R. Station at Guelph, Ont.

This building 56′ x 176′, one storey and basement, was commenced on Nov. 4, 1910. This photo was taken on Feb. 4, 1911. All foundations were carried to rock. Our work, which included everything from excavation to decorating, was completed on March 28, 1911.

WELLS & GRAY, LIMITED,

Engineers and Contractors

315 Confederation Life Bldg., - - TORONTO, ONT.

You should urge the use of Preston Steel Ceilings . . . .

Because. . . . . these ceilings are actually far cheaper than plaster, in the long run, as they never need repairs and will outlast the building it self. Thus they are the most permanent ceiling money can buy.

Because. . . . . Preston Steel Ceilings are fireproof; damproof; sanitary—can be washed as readily as a window-pane. They lower the insurance rate and increase the health rate. They are the modern ceilings—plaster is a mere makeshift.

Because. . . . . Preston Steel Ceilings can be decorated charmingly by any painter, as soon as they are in place. And they have a score more merits of utility and economy that we would like to point out to you, and through you to your customers. Ask for pattern book and price lists. Address

The Metal Shingle & Siding Co.

Limited

Preston, Ontario

Branch Office and Factory - MONTREAL

Over 1,100 DESIGNS

Ask for the book

THE IMPERIAL

MB-13 PLUG DRILLER

OR

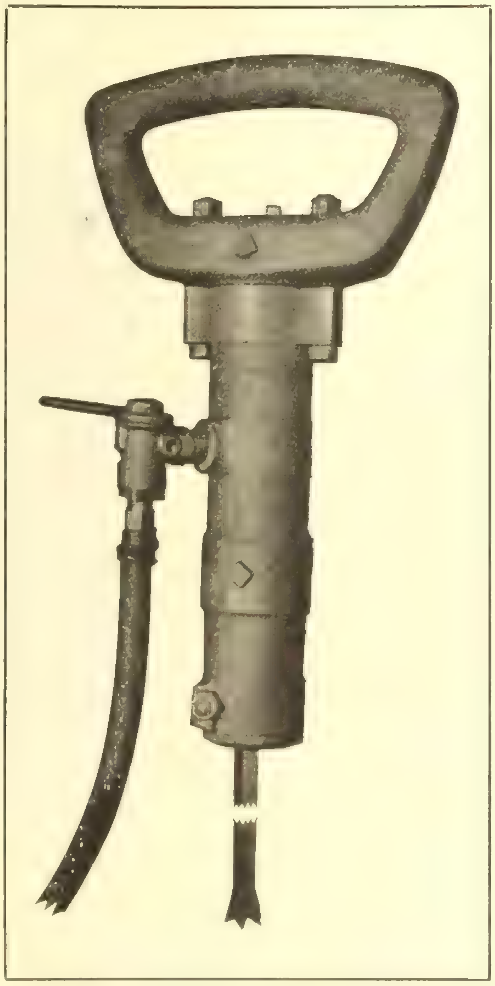
HAND HAMMER DRILL

A MEDIUM weight tool which embodies a great many of the best known principles of Hammer Drill construction, as applied to tools for this service.

The tool is designed for down holes only, yet it has a wide range of application. It has been found to be thoroughly adapted to all kinds of excavation work, particularly to trench excavation for sewers, gas and water mains; in sinking foundations, building bridge piers and in shaft sinking in a mine.

Although this tool has been on the market only a comparatively short time it has found great favor among the contractors and miners, with the result that there is a great demand for it.

The principle of the Hammer Drill is too well known to be explained here, but it's extreme simplicity, (only two moving parts) steady reliability and ease of upkeep should be given proper consideration by Contractors.



As it requires but a moment to change steels and as no setting up is necessary in changing holes; from seventy to ninety per cent. of the time paid for is applied in actual drilling, while with the ordinary piston drill a great deal of time is spent in these operations. This is an important feature where a number of shallow holes are required.

The great number of comparatively light blows of the hammer are much less destructive of steel than the heavier, less frequent, blows of the piston drills, therefore the breakage, dulling or loss of gauge is usually not more than half as great as with the heavy machines. This means a considerable saving in steel and in blacksmiths' costs.

The construction of the tool is of the Rand standard quality, which, we feel, is a sufficient guarantee of its excellence.

Any of the offices below will be glad to give you detailed information and prices.

CANADIAN RAND CO., LIMITED

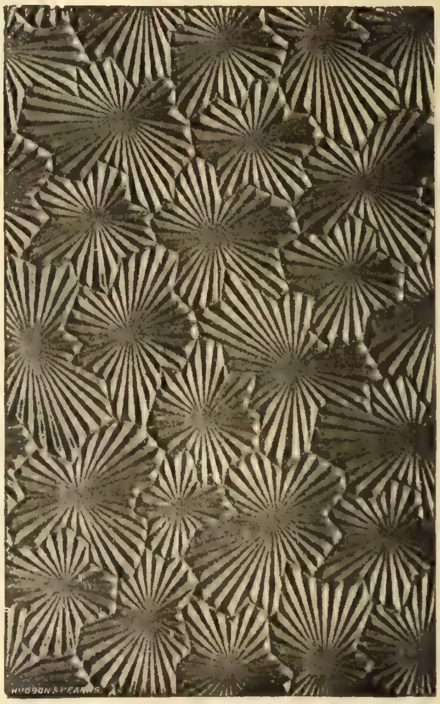
Commercial Union Building, MONTREAL, CAN.

Toronto, Cobalt, Winnipeg, Lethbridge, Rossland, Vancouver, Halifax

Chance's
Double Rolled Cathedral Glass

is brighter and more translucent than the ordinary Rolled Cathedral Glass. It cuts true and easily, and works up handsomely into leaded windows. Made in a very large variety of tints.

Chance's Figured Rolled Glass is famous for its deep, brilliant patterns, easy cutting qualities and attractive tints. The popular "Muranese" pattern illustrated here is made in three sizes, of which this shows the smallest.



Chance's Figured Rolled
Muranese (small) Pattern

"Flemish" Glass, made only in the glass works of Chance Bros. & Co., near Birmingham England, is a new and most attractive Ornamental Window Glass, unsurpassed for character and brilliancy.

Write for samples of Chance's Figured Rolled, Muffled, Double Rolled Cathedral and Flemish Glass.

Agents for Canada

B. & S. H. Thompson Co., Limited

381 St. Paul St. - - Montreal

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Pine and Veneered Hardwood

Midland Brand

We manufacture a very complete line of Pine and Hardwood Veneer Doors. Doors that are just a little better than anybody else's because of the select material and expert workmanship that we put into them.

Our Sash Frames, House Trim and Hardwood Flooring possess the same good qualities as our Doors.

Send along a trial order and be convinced.

Georgian Bay Shook Mills, Limited
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The Smith Marble and Construction Co., Ltd.

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Office & Factory:
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Interior and Exterior Marble, Slate, Floor and Wall Tiles, Mosaics, Plumers and Electrical Marble, Granites for Building and Monumental Work.

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PURE AIR

Positively No Down Draft

(Patented)
Autoforce Air Pump Ventilator

Write us for full Particulars

No fixed charges, power or repair bills. Requires no oil and is absolutely noiseless.

Unsurpassed for ventilation of Schools, Churches, Theatres, Offices, Work Rooms or for Chimneys with poor draft.

THE FORCE DRAFT is obtained by natural laws in its construction for the removal of impure air, securing perfect ventilation and preventing the entrance of objectionable matter. Expensive appliances, heretofore used to produce a draft, are not required.

SOLE LICENSEES AND MANUFACTURERS FOR CANADA

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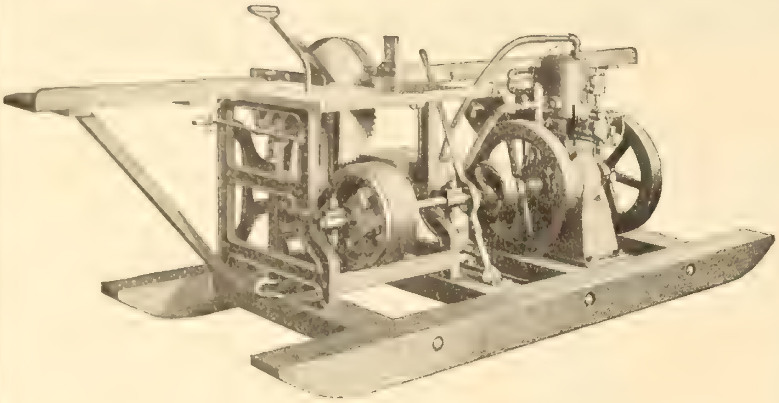
Montreal, Que.

Telephone Main 159

DON'T THROW AWAY Money IN TIME AND LABOR



Increase your profits and business by using the latest up-to-date machinery and methods.

Oshkosh Portable Saw Rigs

Will enable you to bid lower and Beat out your competitors.

Tear Off the Coupon and Mail To-day

Before your competitor gets ahead of you

Manufactured by

Oshkosh Logging Tool Company

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OSHKOSH LOGGING TOOL COMPANY
Oshkosh, Wis.

Gentlemen

Kindly send me complete catalogue and prices of the Oshkosh Portable Saw Rig

Name ....

Town ....

State ....

CONTRACTOR'S EQUIPMENT

At Your Own Price—Must Be Sold Now

All located near Schenectady, N. Y.

One Vulcan Steam Shovel (No. 1117) 70 ton—2½ yd. dipper. In first-class condition—used only by ourselves for part of two seasons. The very latest type with all modern improvements. A magnificent shovel in every particular.

One Locomotive—Boston & Maine standard guage switcher type, 26 ton, with four wheeled tender, 1800 gals. water capacity. Condition first-class.

20 Four Yard Dump Cars. Standard guage. One way dump—South Balto. make. Oak timbers and fine condition. Extra parts, wheels and brasses.

One ½ yard Ransome Concrete Mixer with engine mounted wheel frame—ready for immediate use.

One 100 H. P. Nagle Boiler—Locomotive type, self contained—new—used only two weeks for testing. Has 60-foot stack. A1 condition.

Sixty tons 56 & 60 lb. Steel Rails — relayers—will pass inspection. Two complete (new) turnouts. Will not sell rails without equipment or until the former has been disposed of.

These are main items but we have a lot of other equipment that we will dispose of upon a reasonble bona-fide offer. Write or wire for inspection appointment if you mean business. Terms cash or equivalent.

Fidelity Construction Company

433 Majestic Building :: :: :: :: DETROIT, MICH.

200 MORE BRICK A DAY

with

Renfrew Lime

That is what the bricklayers who use it say, and they are the men who know.

With this fact before you why continue to use other lime that cannot be worked so easily?

Yes, your freight rate may be a little higher but it's worth it.

ALWAYS USE

"Renfrew" the Lime of Quality

Jamieson Lime Co.

RENFREW, ONTARIO

White Lime - Stone - Grey Lime
Brick - Drain Tile

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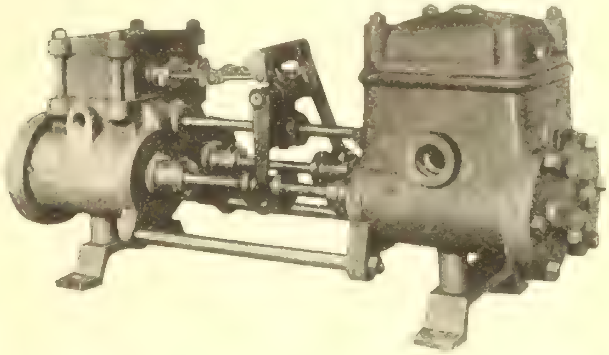
We manufacture a large line of pumping machinery for special and general service.



The above illustrates the Martin Standard Duplex Pump for boiler feeding and general service. They are specially designed for work where the requirements do not exceed a working pressure of 150 pounds per square inch.

Send for catalogue of our Pumping Machinery.

Martin Pump & Machine Co.
Limited
Toronto, Canada

"Hammer Brand"

Hard Wall Plaster

HARD-WALL PLASTER
HAMMER BRAND
HILLSBOROUGH, N.B.

It neither loosens nor falls off, it allows carpenters to follow plasterers without loss of time and lasts as long as the building.

Albert Manufacturing Co.
Hillsborough, New Brunswick, Canada

Works Destroyed by Fire
— Now Rebuilding

" Satisfaction "

Makes

Our

Business

Grow

¶ The increasing sales of our **CHESTNUT TRIM** spells the **" Satisfaction "** of the trade.

Honest work at moderate prices.
Careful attention to details.
Prompt shipment

Coupled with new and neat designs in Doors, Mouldings, Casings etc., means more and better business for us.

Send in your bill of material and let us quote prices.

The Tillson Company Limited

Woodworkers -:- Tillsonburg, Ontario

THE POPULAR AND SUPERIOR

PERFECT BRICK MACHINE

AND MY VARIOUS MOULDS ARE USED IN ALL PARTS OF THE WORLD

Patened in Canada

C. S. WERT

Inventor and Manufacturer of

The Perfect Brick Machine and Moulds

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Write for Catalogue and Prices

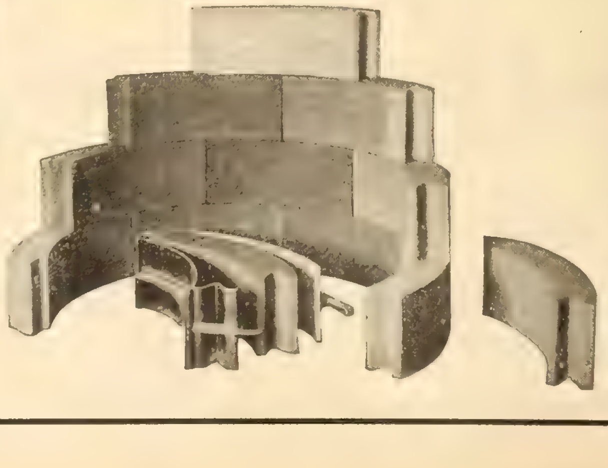
Agents and Distributers wanted in Canada.

THE POPULAR AND SUPERIOR

PERFECT BRICK MOLD

IS USED IN ALL PARTS OF THE WORLD

The Perfect Well, Cistern and Silo Molds



PRICE LIST

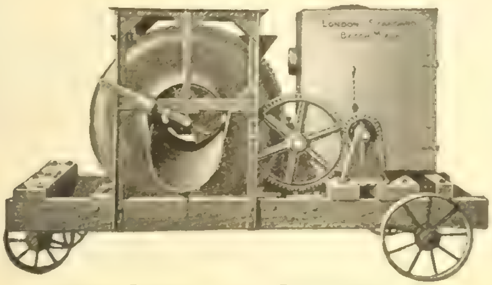
No. 3 Circle Mold. The diameter of its circumference, 3 feet. No. 5 Circle Mold. The diameter of its circumference, 5 feet. No. 7 Circle Mold. The diameter of its circumference, 7 feet. All sizes up to 7 foot retail at $12.00 each All other sizes retail at $15.00 each.

The Circle Moulds vary in length from 22 to 28 inches depending on the diameter of its circumference.

In ordering Circle Molds always give the diameter of what you are going to build and I will then understand the kind of Circle Mold you desire.

No. 10 Circle Mold is 10 ft. diam.
No. 12 " " " 12 " "
No. 14 " " " 14 " "
No. 16 " " " 16 " "

Price $15.00 each



London Standard Drum Batch Mixer No. 1
Equiped with Gasoline Engine

London Standard Batch Mixers

THE LONDON STANDARD DRUM BATCH MIXERS are made in four sizes. namely, one-third yard, one-half yard and one yard batches and are furnished with any equipment.

THE MANY NEW AND IMPROVED FEATURES of the London Standard Drum Batch Mixers appeal to every contractor desiring a mixer of this type. WE CAN GIVE YOU THE BEST VALUE FOR YOUR MONEY of any Firm doing business, BECAUSE we manufacture only Concrete Machinery, and on this account we can sell you a machine at very much less cost than Firms who do not manufacture their own machines but handle a concrete mixer along with other lines of goods.

We also Manufacture—

FACE-DOWN BLOCK MACHINES
CEMENT BRICK MACHINES
POWER CEMENT DRAIN TILE MACHINES
HAND CEMENT DRAIN TILE MACHINES
SEWER PIPE MOLDS
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ADJUSTABLE SILL, STEP AND WINDOW
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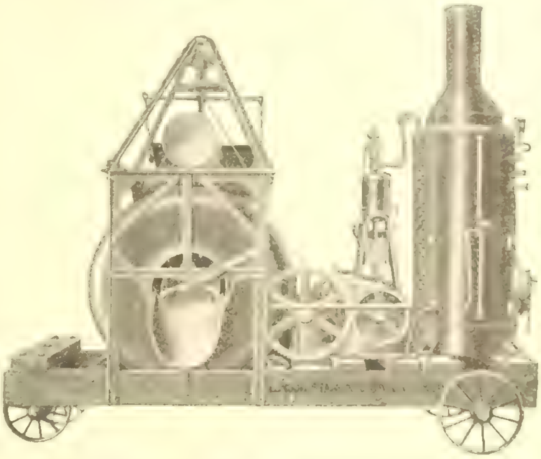
And a full line of CEMENT WORKING TOOLS

We are the largest manufacturers of Concrete Machinery in Canada, and can meet every requirement of the Contractor in the line of Concrete Machinery at the lowest possible cost. Tell us your requirements.



London Standard Drum Batch Mixer No. 2 equipped with Steam Engine and Loading Skip

London Concrete Machinery Co.

Limited
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We are the Largest Manufacturers of Concrete Machinery in Canada

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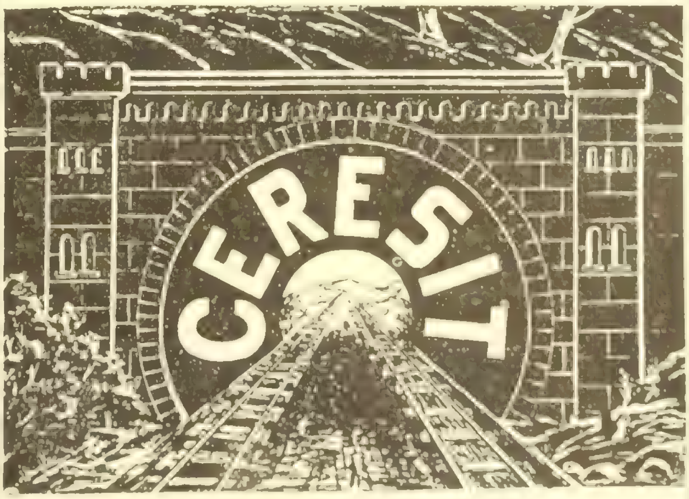
Hydraulic Cranes

H. J. ARMSTRONG

Engineer and Manufacturer

Markdale, Ont., Can.



No Wet Cellars No Damp Basements

Ceresit is a cream white paste readily dissolvable in water. This water is used instead of plain water for mixing Cement, Mortar or Concrete.

Ceresit Waterproofing Co.

115 Adams Street, Chicago

Canadian Agents
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To make Concrete and Stucco Buildings Waterproof and the Surface Color Uniform

is EASY if You Use

GLIDDEN LIQUID CEMENT

This material is a very high quality of cement incorporated with or carried into suspension by a water proofing medium of unusual durability. It can be used either upon exterior or interior surfaces — it binds perfectly to a concrete surface producing a beautiful, decorative effect. The serious drawback to the construction of cement and concrete buildings—their tendency to dry out with a variation of colors is done away with by this material. In addition, its waterproofing quality prevents the inroads of dampness in concrete walls and the consequent corrosion of steel reinforcements.

¶ Glidden's Liquid Cement is made in imitation of sandstone and also a variety of practical shades including **colonial** and **pompeian buffs**, as well as clear white.

Let us send you booklet, color card and free sample for tests.

THE GLIDDEN VARNISH COMPANY

Largest Manufacturers of Varnish and Concrete Finishes in the World

FACTORIES:
Cleveland, Ohio — Toronto, Ont.

BRANCHES:
New York — Chicago

SUPERIORITY PURITY DURABLE AS THE PYRAMIDS

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ESTABLISHED 1886

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A Weekly Journal of
Building, Contracting, Engineering, Public Works
Municipal Progress, Advance Information

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Vol. 25 April 19, 1911 No. 19

Hostility of Labor Unions to Increasing Efficiency

Upwards of fifty bricklayers employed in the erection of a paper mill at Hudson's Falls went on strike the other week owing to an attempt made by the contractor, F. B. Gilbreth, of New York, to carry out the work along certain lines of scientific management. Under Mr. Gilbreth's scheme it is possible for the more skilful workers in many cases to double their wages, but the bricklayers' union believe that with the measurement of their output their cause will be weakened, and that it is encumbent upon them to take protective measures for the trade as a whole.

The methods instituted, or rather invented, by Mr. Gilbreth have lately received a good deal of attention. In the discussion has been told what Gilbreth has been doing in changing methods in general contracting work that have varied little in centuries, the bricklayers' trade for example. The bricks, the mortar and the methods of laying the bricks remain practically the same as when bricks were first used. By experiment Gilbreth found that he could reduce the number of motions in laying a brick from eighteen to five or six. He devised an adjustable scaffold that did away with waste effort in stooping to pick up the brick. Cheaply paid helpers arranged the bricks and mortar in a carrier, after the bricks had been sorted and inspected. Introducing his method on a Boston building he was erecting, he proved that where in a certain class of work 120 bricks to the hour had been a record, his men could now, with less fatigue, average 350 an hour. In the Hudson's Falls contract on which the strike has now been declared a new record in building construction was being established. The possibilities of increasing efficiency along the Gilbreth plan may, according to some observers, accomplish a change in business comparable only to the shift from hand labor to machine production.

A good deal of attention is being devoted to experimental work in Great Britain and Germany as well as in the United States. In the United States Frederick W. Taylor, an engineer, has had for the last eight or ten years a corps of experts installing his ideas in large factories. Taylor believed that even in a simple occupation like shovelling improvement could be made over the old haphazard method. By experiment he proved that a first-class man would do his biggest day's work with a short shovel load of about twenty-one pounds. Putting his theory into practice at the Bethlehem Steel Works, he secured extraordinary results. A hundred and forty-six men proved equal, without physical strain, to do work that had formerly taken 600. The wages paid were higher than under the old scale, but the cost of handling material in that yard was reduced from seven to eight cents a ton to three anad a half cents, and the experiment in "scientific management" resulted in an annual saving of more than $75,000 a year. Taylor carried his experiments from simple operations to complicated machine work. In the cutting of steel he increased the capacity of an operative and of a machine from two to nine times. In the Taylor machine works at Philadelphia the time of manufacture of one highly specialized machine was reduced from eight months to six weeks. The profits increased enormously and the wages went up 33 per cent. without change in the hours of labor.

The attitude of hostility of the labor unions to such methods of increasing efficiency is no more reasonable than the hostility of another day to machine as opposed to hand labor. Labor is, at bottom, at least equally interested with capital in increasing output. Time saving devices have increased not lessened the work to be done, the demand for men to do it and the wages to be earned.

A novel scheme for washing gravel has been in use at Bangor, where construction has been under way for some time on a new mechanical filtration plant, which is being built by the New York Continental Jewel Filtration Company, to replace the existing water purification works. The concrete aggregate is delivered in piles near the work and carried from them to the mixer in wheelbarrows. The gravel contained a certain amount of loam and it was considered necessary to wash it before incorporating it in the concrete. To accomplish this, holes were punched in the bottoms and sides of the wheelbarrows, converting them practically into sieves. Between the mixer and the storage piles a water pipe was connected up with a large perforated nozzle at its discharge end. Each wheelbarrow load of gravel on its way to the mixer was rolled under the nozzle and streams of water discharged upon it, the material being churned about with a spade to expose the lower part of the load to the cleansing action of the water. The water and the loam which is flushed out passed out through the perforations in the wheelbarrow and the clean gravel was then carried to the mixer and used.

The Board of Fire Underwriters has made public its report on the Triangle Waist Factory fire. The number of dead is placed at 145, and the number of operatives who escaped at 360. The underwriters recommend: A fire drill and private fire department in all factories; stairways in fireproof shafts reached by outside balconies; inside stairs in masonry shafts with sprinklers in every building over sixty feet high; wire glass and metal frames for all outside windows.

to the fighters in a general conflagration. The windows, which are ordinarily a point of early attack from surrounding fires, are safeguarded by steel window facings and the doorways by metallic doors.

Reliability of Estimates

A few years ago it was a common impression that an engineer's estimate was always greatly exceeded in actual construction—an idea not altogether without foundation. It is now recognized that there is much greater reliability in the estimates of experienced engineers. A recent report of the Board of Estimate and Appointment of New York gives the estimated and actual costs of 321 pieces of public work in the five boroughs, totalling $29,434,059 in cost. Between 1902 and 1909, inclusive, the totals of all estimates showed a gradual change from an excess of actual over cost of 2 per cent., to an excess of estimated over actual of 9½ per cent. Taking the totals by boroughs, and averaging the eight years, we find that in Manhattan the actual cost was 100.4 per cent. of the estimated; in Brooklyn it was 86.5 per cent.; in the Bronx, 93.2 per cent.; in Queens, 89.4 per cent., and in Richmond, 113.9 per cent.

An interesting feature presents itself when we inspect the items under the heads of sewerage, grading and paving respectively. In every case the percentage of actual to estimated cost is higher for sewers than for either of the other two. The estimates for paving, on the other hand, were higher than the cost in every year for every borough, except in one instance. The grading estimates were sometimes too low and again too high. It would appear from this that even the experience of years has been insufficient to prepare the engineers of the sewer departments to make sufficient provision for the unforseen difficulties in the way of sewer construction which are so generally encountered and are increasing every year.

The Man Who Wins

The man who wins is the man who does,
The man who makes things hum and buzz,
The man who works and the man who acts,
Who builds on a basis of solid facts;
Who doesn't sit down to mope and dream,
But humps ahead with the force of steam;
Who hasn't the time to fuss and fret,
But gets there every time—you bet!

The man who wins is the man who climbs
The ladder of life to the cheery chimes
Of the bells of labor, the bells of toil,
And isn't afraid that his skin will spoil
If he faces the shine of the glaring sun
And works in the light till his task is done—
A human engine with triple beam
And a hundred and fifty pounds of steam.
—Brush and Pail.

According to the construction programme of the railways for Western Canada 170 new towns will be built in the west this year. The Canadian Pacific Railway will establish 50, the Grand Trunk Pacific 24, and the Canadian Northern Railway no less than 96. Surveys have been made for most of these and a few of them will be divisional points.

Applying Asphalt Filler in Brick Pavement Construction

In its report at the last annual convention of the Illinois Society of Engineers and Surveyors the Committee on Roads and Pavements stated that the pouring method, as has been very commonly used, of applying the asphalt filler for a brick pavement should be abolished, as it was both wasteful and inefficient. It was stated that by using a wide fan-shaped snout to the can from which the filler is poured, keeping the asphalt very hot and working from the gutters up to the crown the material may be cheaply and quickly applied. Following the application of the hot asphalt a squeegee in the hands of a competent workman should be used to remove the surplus of material and in such a manner that the chilled material is not worked over any brick which had not been previously coated direct by the flow from the pouring can. It was stated that in this way all joints are more perfectly filled than in any other way and no cold material can get into them or bridge them. The snout of the pouring can should be not less than 6 inches wide and not more than ¼ inch in the clear opening between sides. This admits of very rapid pouring of hot material, but will not pass any that is chilled. It has the futher advantage of being a definitely fixed rule for inspectors to follow and absolutely precludes any possibility of there being a misunderstanding about the proper temperature of the filler when it is applied.

Effect of Fire on Concrete Floor

"An interesting note comes to us from the West on the effect of fire upon the strength of a concrete floor," says the Quarterly of the National Fire Protection Association. "The building in which it occurred was of reinforced concrete and brick, and original estimate of loss was made on the basis that the concrete floors and ceiling were not damaged sufficiently to be torn down. The owner refused to accept these figures, claiming that the concrete had been damaged and weakened. He requested that the building be tested by putting on a weight of 400 lb. to the square foot, and if the flooring deflected more than 3/16 in. same was defective and would have to be removed. This was the original test made by the architects when building was completd and turned over to the owner.

"A panel 14½ x 18½ ft. in the northeast corner of the building was first tested, and when a weight of 250 lb. to the square foot was put on, the floor deflected 5/16 in. Another panel was tested and a deflection of 4/16 in. to 250 lb. was noted. There were eight panels, all approximately 14½ x 18½ ft., which were involved in the fire, and as a further test it was decided to try one panel in another part of the building which had not been damaged by fire, in order to see how the same would show up. The sand used for testing was therefore removed to this panel, and with the same weights, viz., 250 lb. to the square foot, this panel did not deflect over 3/32 of an inch.

"The test seems to demonstrate the virtues as well as the defects of concrete construction. As there were about 60,000 lb. of powdered drugs burned, a tremendous heat was created, which would have meant a total loss to the building had it been of any other construction. At the same time, there is indicated by these tests a defect in concrete which it may be impossible to overcome, and that is, that the reinforcing steel used in its construction undoubtedly expands under a certain heat, causing the concrete to weaken."

Cost Keeping on Concrete Bridge Work

Comments on Contracting and Slipshod Methods of Estimating Employed   Description of a Satisfactory Form of Cost Recording

By Daniel B. Luten*

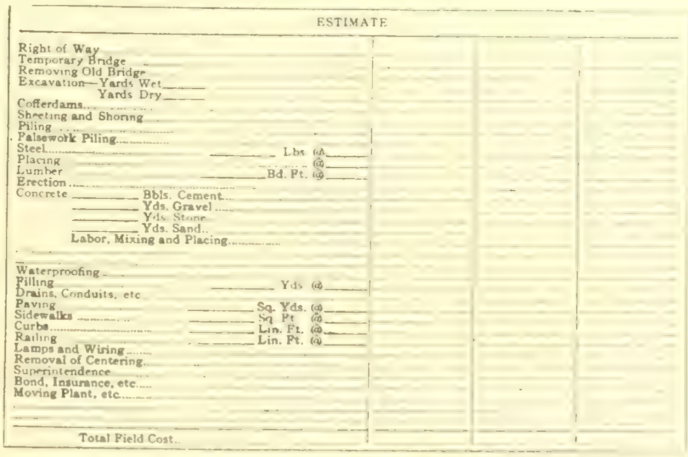
Contractors should keep complete cost records, showing the distribution of cost against the separate items that go to make up the structure; and such cost record should show the complete cost to date at regular and frequent intervals, i.e., daily or semi-weekly. The contractor should be able at any time to turn to his records and quickly ascertain the cost on each separate item of construction. Such a cost record is essential to a proper understanding of the cost of the structure, is valuable in determining the rating of the foreman in charge, and is the only safe basis for determining bids on future work.

To illustrate in greater detail, let us assume that a small concrete bridge is to be publicly let to the lowest bidder, and that its estimated cost is perhaps $10,000, which must not be exceeded. Some eight or ten bidders may appear, of whom one or two will usually be all that have had any previous experience, and only one perhaps will have kept detailed records of cost. All the others bid on a gamble. John Smith, who has had some experience in building a rubble retaining wall, estimates the total measure of concrete in the bridge at 2,000 cubic yards, and recalling that the actual ingredients contained in a yard of concrete are perhaps a dollar's worth of cement, a little steel, and some gravel from the creek, believes that he can build the structure for $4 per yard, or a total of $8,000. Since this is well within the engineer's estimate, he adds a liberal margin of 10 per cent. profit, overlooks all floods and contingencies, forgets about insurance and overhead charges, and perhaps lands the job, and the engineer being also inexperienced, estimates his next proposed bridge by this last one, and thus makes his next estimate on a still lower basis, for he does not wish to appear foolishly high in the eyes of the contractor or the board. Thus the matter of bids is on a continual down grade, whereas the bidder who estimated his work properly, including all items at a reasonable allowance, bid $18,000, including 25 per cent, profit, to which he should be entitled when the dangers of washout and inclement weather are not otherwise taken into consideration. In view of the engineer's estimate, the high bid, although undoubtedly the best bid, seems foolishly high by contrast.

The contractor who thus estimates his work safely, uses an estimate sheet as follows, Fig. 1, in which each and every item that goes to make up the cost of a highway bridge is included:

What each of the items represents in actual cost is known only to the experienced contractor and cannot be given here because it would be of local value only and would be found misleading for any other field. But even the novice in estimating will come far nearer the truth by making a guess for each item and then taking the total, than if he bases his price on the yardage of concrete alone.

There is a popular notion also that the cost of a concrete bridge may be estimated roughly by multiplying the span in feet by the width of roadway by $2. In other words, that the cost approximates $2 per square foot of roadway projected on the span. But this is a dangerous rule, because it gives only the lowest approximate cost for very favorable conditions, and may vary several hundred per cent. The height of the bridge from bed of stream to roadway affects the cost quite as appreciably as the span of roadway. Yet the above rule-of-thumb makes no allowance for height or for numerous other elements that go to make up the cost of the bridge and which vary from place to place. The only safe way to give an estimate on a concrete bridge is to draw it to scale, compute its contents, and then follow the estimate sheet. The contractor who has made a specialty of concrete bridge erection can usually approximate the cost of a proposed bridge by its similarity to some other bridge which he has erected and of which he recalls the details of cost. There is no other safe way.



ESTIMATE

Right of Way				
Temporary Bridge				
Removing Old Bridge				
Excavation—Yards Wet ______				
Yards Dry ______				
Cofferdams				
Sheeting and Shoring				
Piling				
Falsework Piling				
Steel	______ Lbs. @ ______			
Placing	@ ______			
Lumber	______ Bd. Ft. @ ______			
Erection				
Concrete ______ Bbls. Cement				
______ Yds. Gravel				
______ Yds. Stone				
______ Yds. Sand				
Labor, Mixing and Placing				
Waterproofing				
Filling	______ Yds. @ ______			
Drains, Conduits, etc				
Paving	______ Sq. Yds. @ ______			
Sidewalks	______ Sq. Ft. @ ______			
Curbs	______ Lin. Ft. @ ______			
Railing	______ Lin. Ft. @ ______			
Lamps and Wiring				
Removal of Centering				
Superintendence				
Bond, Insurance, etc.				
Moving Plant, etc.				
Total Field Cost				

Fig. 1

The low bidder previously referred to, who secures the contract, goes happily to work. Firm in the belief that he has a paying contract, he takes his time on excavation, overlooking the fact that a dollar saved on a profitable contract is just as good as a dollar saved on a losing contract, until he nears the completion of the bridge, when he happens to find by subtracting his bills still to be paid from his money available, that he is already on the wrong side of zero profits. Then begins a scramble to save all he can, just at the very time when most consideration should be given to true lines and good finish, and as a result the bridge that would have been a monument to its designer and to its builder is made an artistic failure because of a profitless contract. Concrete bridges will never attain their deserved success by such methods. And if a contractor will not avail himself of information from more experienced men that will enable him to bid safely, he ought to be everlastingly lambasted by the engineer when he tries to skimp on the wind-up. To the end that he may not again forget!

A desirable form of daily record for concrete bridges is shown in the accompanying forms, Figs. 2

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*Extracted from a paper read before the American Society of Engineering Contractors.

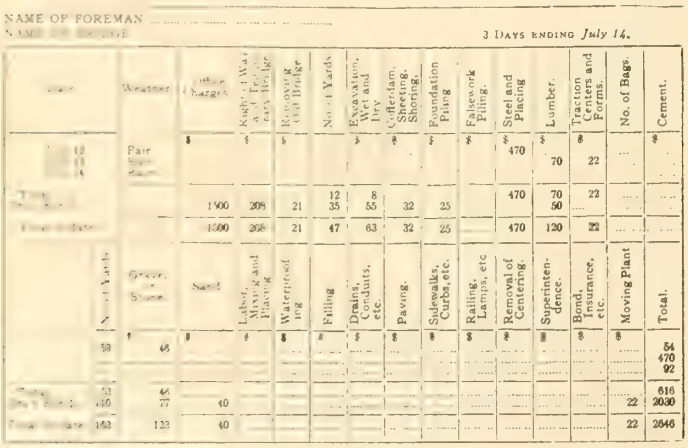
Name of Bridge ....No...... Work Commenced........ Foundation, Kind....Depth ..... Excavation—No. cu. yds. Est....Rep....Extra .... Estimates Paid.
Date of Contract ......Contract Price.... Work Completed .... Miscellaneous Description...... Concrete " " " " .... " .... " .. ..
County........State........Owner........ Foreman.................. Conditions. Gravel " " " " .... " ....Cost at pit..
Built over..............No. of Spans....... Cement " Barrels " ....Used... " per bbl.
Length spans ....Width of Roadway..... Steel " Pounds " .... " .... " " cwt.
[illegible]

		Office Charges.		Right of Way and Temporary Bridge.	Removing Old Bridge.	No. of Yards.	Excavating, Wet and Dry.	Cofferdam, Sheeting, Shoring	Foundation Piling	False Work Piling.	Steel and Placing.	Lumber.	Erection Centers and Forms.	No. of Bags.	Cement.	No. of Yards.	Gravel or Stone.	Sand.	Labor Mixing and Placing.	Waterproofing.	Filling.	Drains, Conduits.	Paving.	Sidewalks and Curbs.	Railing, Lamps, etc.	Removal of Centering.	Superintendence.	Bond, Insurance, etc.	Moving Plant.		Totals. Dr.	Totals. Cr.
July 2	Overhead charges	$1500																													$1500	
3	Foreman's report	1500		$125	$18	35	$55									45	$ 32	$10											$22		1762	
8	" "	1500		175	18	35	55					$ 50				45	32	10											22		1862	
11	" "	1500		208	21	35	55	$32	$25			50				110	77	40											22		2030	
14	" "	1500		208	21	47	63	32	25		$470	120	$22			113	123	40											22		2646	
	Est. by..........	$1500		$200	$25	120	$150	$85	$480	$330	$650	$1150	$1300	4400	$1500	1200	$1150	$450	$1400	$50	$100	$10	$300	$75	$150	$50	$200	$100	$50	....	$10405	....

Fig. 2

and 3. The foreman in charge is required to send to the office at frequent and regular intervals, say nightly or semi-weekly, a complete, distributed statement of all costs incurred on the work since his last report. This statement of cost is for materials actually delivered on the work to be used in the structure, and for indebtedness incurred for labor, freight, supervision, sundries of any kind whatever actually delivered to the foreman. The form is shown in Fig. 3, and is preferably bound in book form with alternate sheets punctured for removal; and a carbon sheet is provided so that the foreman may retain in book form the duplicates of reports sent in. Each report should have the total cost to date carried forward.

Upon receipt of this report at the office, the totals of each column are transferred to the cost ledger as shown in Fig. 2. A glance at the last sum entered in each column will show the total expenditure for that item to the date of the last report, and thus a statement of cost may be kept complete to within two or three days, regardless of whether materials are purchased by the office or the foreman, and whether on credit or for cash. The estimated cost of each item should be entered at the extreme foot of each column in red ink. A comparison of the last entry with the estimated cost at the foot of the column will show when an item exceeds its estimate. And since the items in a bridge are usually completed consecutively, a danger signal is thus provided calling attention to this contract. Each item may in turn be divided into its constituents of yardage or board feet, and the amount accomplished be reported each time. But for the average foreman the system then becomes too elaborate to be practical. A careful following of the cost ledger with the occasional visits to the bridge will enable the contractor or field superintendent to determine whether or not the foreman is handling the work properly.


NAME OF FOREMAN ....
[illegible]
3 Days ending *July 14.*

[illegible]	Weather	Office Charges	Right of Way and Temporary Bridge	Removing Old Bridge	No. of Yards	Excavation, Wet and Dry	Cofferdam, Sheeting, Shoring.	Foundation Piling	Falsework Piling.	Steel and Placing	Lumber.	Traction Centers and Forms.	No. of Bags.	Cement.
12 13 14	Fair [illegible] [illegible]	$	$	$		$	$	$	$	$ 470	$ 70	$ 22	...	$
[illegible]		1500	208	21	12 35	8 55	32	25		470	70 50	22	....	....
[illegible]		1500	208	21	47	63	32	25		470	120	[illegible]	....	....

	No. of Yards	Gravel or Stone	Sand	Labor, Mixing and Placing	Waterproofing	Filling	Drains, Conduits, etc.	Paving.	Sidewalks, Curbs, etc.	Railing, Lamps, etc	Removal of Centering.	Superintendence.	Bond, Insurance, etc.	Moving Plant	Total.
	$ 58	$ 46	$	$	$	$	$	$	$	$	$	$	$	$	54 470 92
[illegible]	53 110	46 77	40											22	616 2030
[illegible]	163	123	40											22	2646

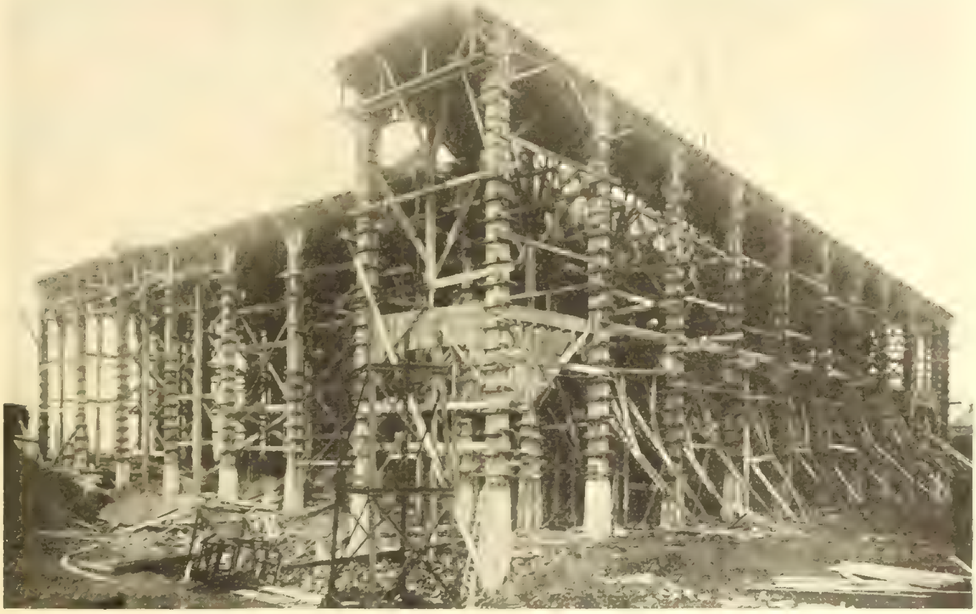
Fig. 3

While the foreman should be encouraged to keep a record of the total cost, and should be expected to become thoroughly informed as to the cost of the various items, yet he should not be permitted to have access to the detailed estimate or to the contract price. The foreman is supposed to build a concrete bridge for the contractor, who is making a specialty of concrete bridges, at the lowest possible cost consistent with good workmanship. He should neither be pinched nor pampered by a possible erroneous estimate. He should not be permitted to know, at least not until after completion, whether the contract results in a profit or a loss. He should be given to understand what quality of workmanship is desired, and then should be encouraged to maintain that at the lowest possible cost; but he should not be swerved from his purpose by possible gain or loss.

Since the contract price is usually a matter of record, and will probably become known to the foreman in spite of efforts to prevent it, it is well to start the cost record with a charge of 10 or 15 per cent. for office and travelling expenses, in order that the foreman may not gain an exaggerated idea of his importance, since he otherwise invariably overlooks the fact that there are other expenses to be borne besides the actual field cost. The knowledge that he has made a few hundred dollars on the field cost of a bridge frequently converts a good foreman into a bad contractor.

J. D. McArthur and a number of sub-contractors who worked on the construction of the Transcontinental Railway, east of Winnipeg, are preparing to oppose in the law courts a reduction of classification, which involves a sum of $700,000. The lead in this struggle will be taken by the McArthur firm, whose interests are identical with the sub-contractors. Among the contractors involved are S. Swanson and the McDougall Bros., of Dryden; Anderson — Johnson, Winnipeg; Guy Campbell, Ottawa; Chambers, McCuaig & McCaffery, of Nepigon; J. A. Dutton and Chas. Peterson, of Winnipeg.

The congregation of St. Ignatius parish, Winnipeg, have decided on the erection of a new building on the corner of Stafford street and Jessie avenue. The architectural style of the church will be in the Italian renaissance period.



Constructional View of the Concrete Storage Plant of the Montreal Light, Heat and Power Company

Concrete Storage Plant at Montreal

The coal storage and handling plant recently erected for the Montreal, Light, Heat and Power Company on Harbor street, Montreal, by Messrs. D. G. Loomis & Sons, of that city, is perhaps unique in the matter of construction. It is entirely of concrete and consists simply of a roof supported by a number of pillars without walls or partitions. The design and specifications were drawn up by Messrs. Loomis & Sons, and the Kahn System of reinforcement was used. The length of the structure is 480 feet and the width 190 feet. The roof has a slant of about half an inch to the foot so that the supporting pillars vary from 38 feet to 43 feet in height. Each pillar is 18 inches square, and they are placed in rows 20 feet apart, making 9 bays running the whole length of the structure. The bracing consists of four brackets three feet outstanding on the beam and 4 feet vertical distance on the column. The roof is a 3-inch concrete slab. Owing to the nature of the subsoil, piles had to be driven under half of the building, while gravel and clay form the foundation under the other half. The concrete pillars were sunk a distance of 7 feet to the piles and hardpan. A coal carrying crane runs on the lower flange of an 18-inch steel I-beam, hung from the concrete roof-beams. The concrete beams which support the roof and the I-beam are 5 feet 8 inches apart on the centre.

To construct the false work for the building it was necessary to resort to unusual measures, owing to the extreme height of the roof. The column forms were first erected in the usual manner and between every pair of columns was placed the 6 by 8 inch strut. This was reinforced at the top so that the whole weight of the 20-in. by 20-in. girder beams and roof-slab was brought down on the column forms and on the strut. The side of the beam-forms was made up of 3-in. by 14-in. timber joists, thus leaving the interior of the structure exceptionally free from struts during construction. Owing to the height of the column it was found necessary also to build up the column reinforcement after the column forms had been placed. The reinforcement for each column consisted of four round one-inch rods—one at each corner throughout the entire length of the column—and surrounding these rods was a cage made of Kahn ribbed metal bent to rectangular shape. This was slipped into the form in section one on top of the other until the top of the column was reached, when the filling was proceeded with.

An Interior View of the Work

This structure was built as a store house for coal for the Light, Heat and Power Company, close to their gas house. It is easy of access from the harbor front, and owing to the facility with which coal can be handled at the gas works it will mean a saving of thousands of dollars every year to the company. The structure has been equipped with the latest devices in the shape of carrying cranes so that from any part of the building the huge buckets can be let down into the coal and a cartload at a time can be lifted and conveyed wherever it is wanted in a few moments' time.

Horseshoe Dam on the Bow River, Alta.

Noteworthy Features of an Interesting Engineering Work at Horseshoe Bend Long Earthen Embankment and a Reinforced Concrete Spillway

By A. S. Dawson, Chief Engineer C. P. R. Irrigation Department

The Horseshoe Dam, a mammoth structure which is attracting the attention of the engineering world all over this continent, is being built on the Bow river at a point locally known as Horseshoe Bend, about three miles southwest of Bassano, which is 83 miles east from Calgary, Alta. The function of the dam is to divert water into the main canal of the eastern section of the irrigation block.

At this point the ordinary low water level is elevation 2515.00. The elevation of the sills of the canal headgates is 2549.63, and it was desired to raise the water to give a depth of 11 feet above these sills, making nomal water level at the dam 2560.63.

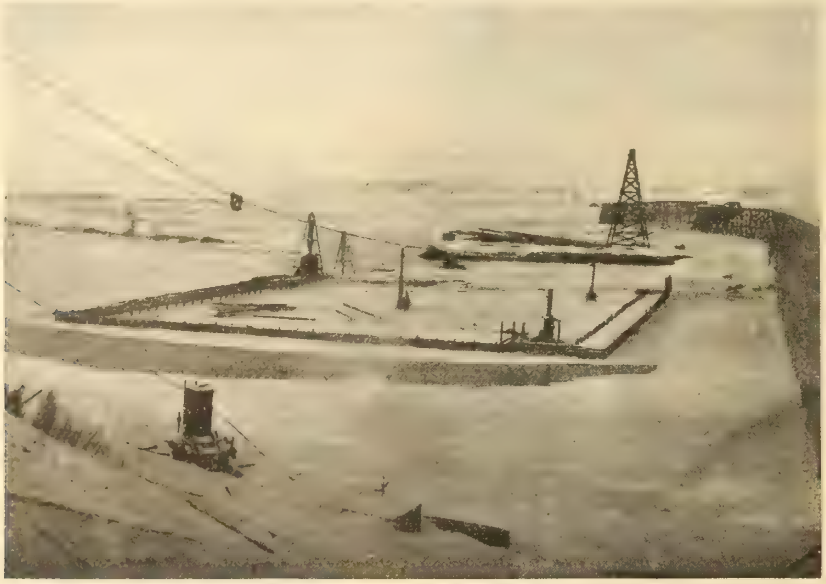
The dam is to be a composite structure, consisting of a long and high earthen embankment on the south bank of the river, and a reinforced concrete spillway in the existing river channel, connected at its northerly end with the canal headgates.

Just above the site of the dam, the river makes a long bend, in the shape of a horseshoe, which gives the locality its name. The dam is located at the toe of the horseshoe. At this point, the river is approximately 600 feet wide. The north or the left bank of the river has a narrow bench immediately at the water's edge and only a few feet above it, beyond which is a cut bank rising over 100 feet above the bed of the stream.

The south or right bank has a gravel beach rising gradually until it forms a tongue between the two legs of the horseshoe. This tongue has a broad, flat top several hundred feet in width, and rises gradually to the general prairie elevation. The general elevation of the surface of this tongue near the river is about 25 feet above the bend of the stream. On the tongue, an earth dam is now under construction, to which the spillway structure will be joined.

The earthen embankment will have a maximum height of about 45 feet, a total length of about 7,000 feet, and at its highest point is 350 feet in width at the base. It will contain one million cubic yards.

The wetted slope is to be 4 to 1, the dry slope 3 to 1, and the top width 32 feet, with a freeboard of 9 feet above normal water level. Provision has been made for under drainage, and its upper slope will be paved either with boulder concrete or reinforced concrete slabs. The foundation of the earth portion consists of a deposit of river silt over coarse gravel and boulders, which in turn overlies dense blue clay.



Coffer Dam Construction, Canadian Pacific Railway Dam at Horseshoe Bend.

The spillway was designed to pass over its crest 100,000 second feet without raising the surface of the pool above elevation 2562.63, or 13 feet over the crest, which required a free length of weir of about 600 feet. To allow for end contraction on account of the piers necessary to support the movable crest, an aggregate length of 650 feet between piers was decided on.

As the crest of the dam and the sills of the canal headgates were fixed at elevation 2549.63, the additional depth of 11 feet for which the canal was designed, had to be maintained by some form of movable crest for the entire length of the spillway, in order to pass extreme floods. This movable crest will be divided into 24 sections and supported between piers giving 27 feet clear spans. These openings will be regulated by structural steel gates, either in the form of segmental Taintor gates or by "Stoney" sluices.

In the determination of the spacing of the buttresses due consideration was given to the effect upon the cost of construction, the time required to build the structure, and the limitations in length of the gates corresponding to the spacing of the buttresses, with the result that these are to be at 15 feet centres, with every second buttress carried up in the form of bridge piers, with clear spans of 27 feet. Emergency gates will also be provided in case of necessary repairs to be made to the main gates.

The spillway proper is to be a reinforced concrete structure of the so-called Ambursen type, consisting of a heavy floor built upon the bed of the stream with suitable cut-off walls at its upstream and downstream edges, and upon this floor will be erected parallel buttresses of substantially triangular outline, having a slope on the upstream edge of about 45 degrees. Upon brackets or haunches projecting from the faces of the buttresses and parallel to the upstream edges will be cast concrete slabs to form a deck, terminating at the top of the buttresses in a curved crest and passing down over the downstream edge of the buttress in the form of an apron suitably curved to correspond as nearly as possible to the path of the overfall flood waters. In front of the dam, the floor will be carried downstream a distance of about 90 feet, forming a tumbling hearth.

Pile Trestle at Horseshoe Bend, erected by earthwork contractors for transporting 1½ million cubic yards from Main Canal B to Dam on opposite side of river.

In general, the cross section of the spillway is what is known as the Ogee section, and consists of constructing a downstream face of the dam between the crest and the floor in the form of a reverse curve, the lower edge of this curve being tangent to the floor of the structure, so that the overfalling nappe should be led down the fact of the dam and turned into a horizontal direction tangental to the river bed with the least possible disturbance, while passing over the face of the structure.

The spillway is founded on a deposit of sand, gravel, and boulders, overlying a thick stratum of stiff, blue clay. At the upper and downstream edges of the structure; as well as at the centre, heavy cut-off walls are being carried well down into the clay and well bonded to the body of the carpet.

The structure is to be 720 feet in length between abutments, with a maximum height of 40 feet to the overflow crest, above which 11 feet of water will be retained by the gates above referred to. It will contain about 40,000 cubic yards of concrete, and two and one-half million pounds of reinforcing steel. Provision will be made for a road bridge on top of the structure.

The abutments connecting the spillway with the earth dam will be in the form of reinforced concrete retaining walls of the counterfort type, with a view of cutting off all possibility of leakage at this point.

The question of the operation of the gates has not yet been decided upon, but either a small power plant, consisting of vertical turbines with direct connected generators, will be installed inside the dam for this purpose, as well as lighting, or else natural gas will be made use of.

The canal headgates will form an integral part of the spillway structure at its northerly end. They will consist of five openings each twenty feet, controlled by Stoney sluices. These gates will control the discharge through a main canal of 70 feet bed width, carrying 11 feet of water, and designed to discharge 3,000 cubic feet per second.

The city of Toronto wants pure water but not if it is going to spoil the appearance of the Island shore. In spite of the city engineer's protest the civic Island committee have forbidden the contractors, Messrs. Dill, Russell & Chambers, to take any more sand off the beach.

The contractor for the Cumberland street fire hall at Ottawa obtained the work upon a bid of $21,000. After $17,000 had been paid and the work was rather more than half done he made an assignment for the benefit of his creditors. The architect admitted that the figures on the contract were far too low. This case should appeal to the opponents of the lowest tender system.

Mr. H. M. Burwell, of Hermon & Burwell, reporting to the city water committee of Vancouver, B.C., estimates the cost of a supply main from Capilano Creek to the suburban district of Point Grey at $302,820. The report is still under discussion.

Principles of Modern Road Drainage

Practical Suggestions looking to the Most Satisfactory Construction The Use of Side Drains, Tile Drains and Catch Basins

By F. J. Ure, A. M. Can. Soc. C. E., City Engineer of Woodstock, Ont.

The principles underlying road drainage have been so thoroughly inculcated into the minds of road builders and municipal representatives by Mr. Campbell, Mr. McLean and others that it would seem as if nothing more could or need be said to emphasize the need of a solid (that is, a dry) foundation for the road. I shall therefore take it for granted that everybody concedes the necessity for getting and keeping the water out of a road, and give a few practical suggestions as to how this may best be accomplished, based entirely upon my own experience.

Open side drains are useful and necessary to carry off the water in heavy rainfalls, but should not be depended upon for the drainage of the subgrade. In the first place they are not usually deep enough for that purpose, and if they are deep enough they are unsightly and dangerous; and in the second place they do not draw the water out of the soil as well as a tile drain.

Installation of Tile Drains

Tile drains should not, as a rule, in my opinion, be placed in the middle of the road bed, for in that case the water will be drawn from the open ditches and from the soil beyond, through the road-bed, and while a drain so placed will eventually dry out the road-bed, it does not keep it dry, while if the drain is placed at the sides of the road, and if the road has a proper crown, very little water will ever get into the road-bed. If the land through which the road passes is nearly level, then a drain should be placed on each side, preferably in the shoulder of the road-bed, say about 10 feet from the centre, but if the road ditches are not too far apart a drain laid in the bottom of the open gutter, with about two and a half feet of covering, will be less expensive and will give good results.

However, if the land has a decided slope away from the road on one side, then one drain placed on the higher side (that is, the side from which the water comes), will be found sufficient. Nothing less than 4-inch tile should be used, as the smaller sizes are much too easily blocked up. Larger sizes may be necessary where outlets are long distances apart. In many cases the owners of the adjoining lands are using the open ditches as an outlet, or they may wish to connect their private drains with the road and in such cases it will be mutually advantageous to put in larger tile and share the cost. It should not be necessary to point out the necessity of securing for all the drain a good and permanent outlet, and yet being one of the hardest things to get it is one of the things frequently neglected and a great deal of money is thereby wasted. If the outlet is into an open dith or natural creek, the end of the tile should be protected by a small concrete abutment, or if the tiles are near the surface, as they often are, a very good way is to lay the tile in concrete and cover them over with say 4 inches of the same material, thus making a continuous concrete pipe of such length as the circumstances seem to require.

If the outlet is to be into another covered drain I would recommend that the junction be made in a suitable catch basin. Speaking of catch basins, I consider them of great advantage to a drain if built in a permanent and suitable way. I have had experience with all kinds of catch basins and in my opinion the best, and therefore the cheapest, is the one built in place, and of concrete. It should be about 2 feet square inside and have a concrete bottom and top, the former to be about 12 inches below the bottom and the latter to be level with the surrounding surface and fitted with a removable cast iron grating of sufficient weight to insure its remaining in its proper place. Some of the advantages of the catch basins are: (1) That they admit surface water into the drain readily and insure the drain working to its full capacity, even when the ground may be frozen. (2) They are useful as inspection holes and enable one to ascertain if all parts of the drain are in working order (3) The pit in the bottom serves as a trap to catch all sediment that may get into the drain. (4) They serve as a vent to let the air escape from the drain and enable it to run to its full capacity, which obviously a drain sealed at both ends will not do. For this last reason I like to have a catch basin near the upper end and at such other points as may seem advisable.

The Drainage Laws, and a Simplified Procedure

In cases where new outlets have to be provided or old ones improved, and where large tile have to be provided in order to accommodate the drainage of adjoining lands, the aid of one of the Drainage Acts will sometimes have to be invoked. Usually the Ditches and Watercourses Act is the one most suitable. I am not one of those who have a mania for tinkering with the drainage laws, but in my opinion it would be a distinct improvement if a "County Road Superintendent" were given power to call meetings and sign agreements under the Act instead of requiring this to be done by the Warden of the County, who often resides at a long distance from the scene of action. A plan frequently adopted in my county, to shorten and simplify the procedure (while not complying with the Act) has been found to work out very satisfactorily and at a minimum of expense. This plan is as follows: the superintendent goes over the road and finds out what private individuals are likely to be affected by the necessary drainage of the road and gets them all, if possible, to sign a document agreeing to waive all their rights to the Statutory Notice and leave the whole matter in the judgment of the township engineer, who then comes on, surveys the drains and outlets, fixes the size of the tile and the amount each man should contribute, puts it in the form of an award and files with the clerk. The superintendent lets the contract or carries the work out by day labor and collects the cash from the individuals and turns it over the the county treasurer. While this method is not strictly "according to Hoyle," it is at least a cheap and expeditious way of settling a multitude of small cases that if dealt with separately would involve so much trouble, delay and expense that the county might better pay the whole shot than bother with it. Of course if any one refuses to sign the agreement his case must be dealt with in the regular way. One result of this policy has been a very marked improvement in the appearance of the roadside and adjoining lands. Waste places, marsh grass, willows and bullrushes disappear and a general cleaning up usually follows.

I have been speaking largely of my own experience in the County of Oxford, where natural or artificial outlets are generally easily obtained. Of course, we occasionally have bits of swamp road where we have to be content in the meantime with surface drainage only, but these isolated cases will not exist long, as the covered drain is rapidly taking the place of the open ditch. To show how rapidly this is taking place in my county, I have taken the trouble to go back over the work done in 1910, and I find that I have land out under the Drainage Acts 40 miles of tile drains, of which 5,700 feet were of 18-inch tile, 12,600 of 16-inch, 15,600 of 14-inch, 45,000 of 12-inch, 35,000 of 10-inch, 30,000 of 8-inch, and 70,000 less than 8-in. in diameter. The tile alone cost about $19,000, and when drain and placed in the drain cost about $35,000. This,of course, is exclusive of private drains and county road drains of the first, of which there is no second, and of the latter there would be about 8 or 10 miles.

I find that my subject covers "Drainage Laws," which is usually taken to mean a criticism of existing laws with suggestions for amendments. I do not propose to take up that branch of the subject, not that I think they are fairly satisfactory and workable, in proof of which I would cite my own experience last year, when between $50,000 and $60,000 worth of drainage work was spread on the tax rolls without a single dollar being spent in litigation and without a single appeal to the County Judge. Of the 42 drainage schemes initiated not a single one was abandoned.

Concrete Tile Plant at Woodstock

A great deal of difficulty has been experienced in the past in getting a sufficient number of tile, particularly of the larger sizes. This difficulty has been largely overcome in this district by establishing in Woodstock a plant for making cement concrete tile. The tile are machine-made and steam-cured and being made of crushed gravel and Portland cement in the proportions of about 4 to 1, and being uniform in size and shape, compare very favrably with the best clay tile, so far as appearance and ability to stand rough usage go. They fit together well and appear to make an ideal drain. This plant has been in operation only about six months and has turned out about 130,000 tile, half of them being from 8 in. to 16 in. in diameter and the remainder under 8 inches.

Specifications for Scrubbed Concrete Surfaces*

For all surfaces of concrete that are to be exposed to view face forms shall be straight, smooth, evenly matched, and watertight, and so framed and fastened together at corners and angles with screws or clamps as to be detachable and removable without the necessity of jarring or of prying against the concrete. Any offsets that may appear at joints shall be dressed off flush, and any openings at joints or corners, or any known holes or other voids, shall be plugged flush with some stiff plastic substance such as clay mixed with plaster of Paris or sand. Before placing the concrete the whole surface of the face form shall be coated with petroleum or other water repellant to prevent adhesion of the concrete.

The concrete shall be thoroughly mixed, be wet enough to flush and be spaded against the face form to the point of being completely flushed against the form, i.e., until the cement soup or grout follows and envelops the spade. Then the spade is to be used to ram the concrete near the face so as to push the aggregate of the concrete forward to the face, care being taken to obtain a uniform mix and texture at the face.

The work of placing concrete shall be continuous throughout definite stages so that joints between different days' work shall be at some feature line, or be made truly straight and level.

On the day after placing concrete, or later, as will be determined according to the temperature and the weather and the setting quantity of the cement used, while the concrete is friable and pulverable, the forms shall be carefully removed and the concrete surface immediately scrubbed until the surface film is removed and the aggregate is exposed to a uniform degree, and then rinsed off with water and kept moist for several days. If any void spaces appear or if spalls are broken off the defects shall be patched with similar mix immediately after the scrubbing, using the hand or wooden float—not a steel trowel—for applying and smoothing the patches. After they are sufficiently set —say within from 5 to 24 hours—all patches must be scrubbed to the same texture as the general surface and be rinsed clean and kept moist for several days.

If a granolithic surface is specified it shall be made by placing against the face forms in advance of the body concrete a fine granolithic or facing concrete composed of 1 part Portland cement, 1½ parts sand, and 2½ parts pebbles or crushed granite or other approved stone as may be selected, screened to pass ½-inch and be retained on ¼-inch screen, thoroughly mixed and soft enough for full flushing. This granolithic must be maintained between the body concrete and the face form in a thickness of about 1 inch, care being taken that the body concrete is rammed into and perfectly united with it. If iron or wooden moldboards are used to retain the granolithic against the face while placing the body concrete, care much be taken that the board is not permitted to remain until initial set takes place, but be frequently jarred and raised slightly at short intervals to prevent the formation of shuts and seams and air spaces between granolithic and concrete.

For scrubbing the surface ordinary fibre brushes with a light stream of water from hose or can will be sufficient if the set is not too hard. If set is harder, wire brushes followed by fibre brushes and rinsing may be used.

If for any reason a portion of the face form can not be or fails to be removed before the concrete has become too hard for removing the surface film by scrubbing, the hard face shall be treated by sand-blasting or tool-dressing to a texture matching the scrubbed portion. If it be tool-dressed it shall be cleaned after tooling by washing it with a 1 by 10 solution of muriate acid and water, then thoroughly rinsing with water to remove all traces of the acid.

In scrubbing, or sand-blasting, or tool-dressing, care must always be taken to avoid roughening or blunting corners of the work, and to maintain all edges sharp.

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* Presented to the National Association of Cement Users

Proposals and Bonds in Contract Work

Binding Nature of Preliminary Agreements — How Contractors are Affected by Low Estimates — Certified Cheques and Bidding Bonds

By Daniel J. Hauer

Proposals made for construction work, either on regular forms or by letter, are preliminary contracts and are binding on contractors. The contractors can be held to them, but the party to whom they are made can reject them. Some construction contracts make proposals a part of the regular contract and they are incorporated in the articles of agreement. Thus proposals should not be made without thought and contractors should realize that any proposal made, can be made binding on him. To hold a contractor to a proposal, when he wishes to revoke it, a suit at law is necessary. In order to avoid such suits, and to enforce proposals, certified cheques or bidding bonds are demanded,when proposals are made. These, however, will not hold a contractor, should he desire to forfeit them. In most cases, though, they serve as an incentive to make good the proposals.

Proposals for Public Work

Proposals for public contracts are, as a rule, made on forms prepared for the purpose, and are sometimes made a part of the contract. All proposals, whether for public or private work, should be made out strictly according to the form, and for the work as outlined, and for such items as are listed. The plans and specifications should also be followed, and all instructions given regarding bids and proposals should be carried out to the letter. It is only in this manner that the proposal can be considered formal. If the proposal is informal in any respect, then by protest of other bidders, or on public work by protest of a taxpayer or industrial or commercial organization, the bid or proposal must be thrown out.

Should the contractor wish to make another offer, as to plans, methods of doing the work, or a change of specifications, or even as to different materials being used, he should fill out the proposal form according to instructions, and on another form or by letter submit an alternate proposal. He has then conformed to all the necessary requirements. Should his methods of doing the work, or other features of the construction be patented, he should have the owner ask for alternate propositions, and if this is not possible he must then submit his proposal in proper form.

In making proposals the contractor should be careful as to figures written on the forms. Mistakes are easily made in placing decimal points and also in putting in ciphers. Such mistakes can be very disastrous to contractors. For this reason all proposal forms should have space provided on them for writing out the prices submitted as well as to giving them in figures. Care should be exercised in making out proposals as to the units of work that prices are to be submitted upon, as cubic feet are used in some localities, while cubic yards may be the unit in other places. Many other units also vary.

Limiting Proposals

Nearly all proposals are dated, whether they are made by letter or on regular forms. On the other hand a limit of time for the acceptance of the proposal is seldom given. This may be important in some cases. Ordinarily, the award is made on proposals received within a few days or a few weeks. Under such circumstances a limit on the time of acceptance is not necessary, but if the letting is held up some time, say some weeks or months, then it might make a decided difference to the contractor. He may obtain several other jobs, or conditions under which he bid may change. The prices of materials may go up, so that there is no longer a profit in the proposed job at the figures submitted. For these reasons a time limit on the acceptance should be named. If the proposal does not state that the prices are for immediate acceptance then it becomes necessary to write a letter after the proposal is made, notifying the owner (or his agent) that unless the proposal is accepted within a certain time it is to be cancelled. This is what every wide awake merchant does when he quotes prices upon his goods. Unless a time limit is set the contractor can be held to his proposal for months after it is submitted. The writer has known of cases of this kind. In New York City, on October 26, 1910, 75 bids were received on the building of a new subway, and up to date an award has not been made, yet it is doubtful if any contractor, who bid, has withdrawn his proposal or set a limit on the acceptance of it.

A complication that may arise in this connection is upon public contracts, where certified cheques are deposited with the bids. Although the contractor may withdraw his proposal, yet the owner may be able to hold the contractor to his bid by refusing to give back the certified cheque.

Engineer's Estimate

It is customary on all construction work for the engineer for the owner to make an estimate of the cost of the proposed work. Seemingly this estimate is of small importance to contractors, yet it may be a vital matter before the job is finished. Contractors should be interested in engineers' estimates.

What is an engineer's estimate? For years it has been little more than a guess at the cost of the proposed work, even when the actual quantities of the work to be done are known and changes in construction are not found necessary. To a more or less extent this has been caused by engineers using prices of other construction work, in making estimates, rather than actual costs. The result has been that the estimate made by such an engineer has been the engineer's guess. If the quantities were subject to change and the prices guess work, it is evident that the total estimate may vary exceedingly as finally completed. There have been numerous examples of this character. A long list of great undertakings that have cost many times the estimated cost could be cited. The most recent example is that of the Panama canal.

However, a marked improvement has been made in this connection during the past decade. Engineers are learning much about costs, and much has been written on the subject, so that in some cases engineers are more proficient in such matters than contractors, many of whom still guess at construction costs. Nor are engineers always to blame for incomplete surveys and low estimates. Frequently tentative estimates are used on purpose by officials of corporations and promoters, as complete estimates on underground exploration and surveys have in the past, in many cases, been poorly made with the result that from lack of knowledge the work has cost much more than the estimated figure. Then, too, sweeping and decided changes in the plans, that the engineer may have advocated from the start, are ordered after the estimate has been made. It has been stated that a competent engineer, knowing as he does that these things will affect his esitmate and throw discredit on his work, does wrong in submitting himself to such criticism, but we must bear in mind that engineering positions are difficult to obtain, and even if the engineer resigns, another will no doubt take his place and do the same things.

How Contractors are Affected by Under Estimates

Contractors often suffer from the discrepancies and blunders in estimates. Should the work be of a public nature, the ultimate contract price may exceed the appropriation, and the contractor may be held up on his work, or on his final payments, or it may even happen that the contractor cannot recover for all the work that he has done. If the contract is a private one, the extra cost may mean the financial ruin of the enterprise, with the consequent stoppage of the work, and a possible heavy money loss to the contractor. These things often happen,

Another manner in which contractors are affected by engineers' estimates is in the letting of work, and the use of engineers' estimates in accepting and rejecting bids. For instance, an engineer's estimate for a proposed sewer may be much too low, and after a number of contractors have each spent several hundred dollars and considerable time in making investigations and estimates and in submitting proposals, they are informed that their bids are rejected. This may happen several times for the same job. The writer believes that when the engineer's estimate is to be used as a basis for accepting and rejecting bids, this estimate should be made public before the bids are submitted, so that the contractor can have the estimate verified, and if it is found too low, need not waste time and money in bidding.

This is being done on the New York State Barge canal. To make public the engineer's estimate is to show confidence in contractors, and inasmuch as the engineer and his assistants have spent considerable time and money in getting up the estimate it would be of vast assistance to the contractor, who may have but a few days to make an estimate. If the estimated quantities are made public, and as a rule they are, then there is every reason why the estimated price of the engineer should not be made public. In public contracts the proposal is often made a part of the contract, so it would seem advisable to make the engineer's estimate a part of the contract. This would serve several purposes. It would fix upon the engineer the responsibility of making a correct estimate. It would serve to fix the cost of the work, and to show prospective profits, in case a contractor, after underestimating the work and obtaining the contract, finds he is losing money and, by picking a flaw in the contract or specifications, throws up the job and brings suit for prospective profits. Then the engineer's estimate being a part of the contract, could be introduced as the work of an expert, showing the cost of the construction with a reasonable profit, as made up before the contract was let.

Certified Cheques and Bidding Bonds

In asking for proposals, especially on public contracts, it is customary to stipulate either a certified cheque, a bidding bond or a cash deposit. The cash deposit is seldom used, except when the amount is small. There is often demanded a small cash deposit from the bidder on receipt of the plans and specifications, which sum is given back upon the return of the plans and specification in good condition.

Certified checks and bidders' bonds to some extent guarantee the assumption of a contract by the successful bidder, and show his standing. A bidding bond has many features to commend it. A bonding company, through its experts, passes upon the financial standing of the contractor, as well as his reputation for making and carrying out contracts. This is a help to the engineer, whose investigations into such matters must be limited. Then, too, the bonding company will insist upon the contract being signed properly and promptly, in order to be relieved of its responsibility. The contractor's only valid objection to such a bond is its cost, which is small.

Many contractors prefer to deposit a certified cheque. There are many abuses regarding this custom. It is seldom stated how long such cheques are to be held before they are returned to the unsuccessful bidder. This is wrong, as many contractors of limited means cannot afford to indefinitely wait for the return of such sums of money, and are frequently compelled to borrow money to allow these cheques to remain on deposit. This could be avoided by stating specifically the length of time cheques are to be held. Then, too, the amount of the cheque should be given as a specific sum, large or small, according to the size of the contract, and not a per cent. of the amount of the bidder's proposal. Frequently 5 or 10 per cent. of the bidder's estimate is the amount asked. In the latter case this at times may give to competitors information regarding a contractor's bid, as bankers are frequently interested in contracting operations as partners of contractors, and such knowledge coming to them is certain to be taken advantage of and used by the banker and his friends. Then, too, the amount of the cheque could leak out in other ways. Some specifications call for cheques only on local banks, which is a discrimination, as strangers to these banks may at times have to pay for certification.

A practice to be commended is that adopted by some divisions of the Army and Navy Departments of the national government, of having contractors make an annual guarantee bond to cover proposals made during the year. This does away with certified cheques. These bidding bonds guarantee that the contractor will enter into a contract within the time limit named.

Construction Bonds

In nearly every contract of any magnitude or importance there is a clause calling for a bond to be made by the contractor in favor of the other party to the agreement. These bonds are either furnished by a surety company or are personal bonds. Personal bonds are not much used now, as no one wishes to see a friend lose money on his account, and they are only furnished either for very small contracts or when surety companies refuse to write the bond.

There are three forms of bonds in general use on construction work:

(1) A bond made for a stipulated sum or a per cent. of the amount of the contract for the faithful performance of the work at the contract prices.

(2) A bond, not only calling for the completion of the work within a specified time, but also calling for a fixed sum to be forfeited each day the job is delayed beyond the contract time.

(3) A bond similar to the second one, but also allowing a daily bonus for each day that the contract is finished before the day named in the bond.

Besides the bond a percentage of the monthly estimates is also retained by the company until the contract is completed.

The amount of the ordinary bond is either a [illegible] or a certain percentage of the total amount of the bid, the life of the bond being until the work is completed and final settlement made between the parties to the contract. The purpose of the bond is to hold the contractor to his agreement, yet the cost of the bond is paid indirectly by the other party to the contract, as the contractor probably has included its cost in with the other expenses of the work. The more irksome and strict, the longer its life, the greater is the cost of the bond. An engineer, by making his bond too strict and objectionable, may injure his employer's interests rather than serve them.

The first named bond is the one most frequently used and covers most classes of work satisfactorily.

The second and third are bonds used for jobs upon which a strict time limit is set and when the completion of the job is of great importance and the matter of a day or week is of momentary value to the owner.

Retaining Percentages

It is the custom on most contracts, in addition to having a bond, to retain a percentage of the monthly estimates until the job is completed. This is known as "the retained percentage," and besides protecting the owner against overpaying the contractor on monthly estimates, which are supposed to be approximative only, also serves to compel the faithful performance of the contract. The amount generally retained is 10 per cent., although on some contracts 15 and even 20 per cent. of the monthly estimates is sometimes held by the owner. On hazardous jobs such as deep foundations and dams 25 per cent. is sometimes retained and the writer has known of one case where 33 1/3 per cent. of the estimates were retained. Occasionally general contractors, who sublet much work, have 10 per cent. retained from their estimates and they retain 15 per cent. of their sub-contractor's monthly estimates.

If the contractor breaks his agreement the retained percentage is forfeited. Each month the amount of the retained percentage is increased and the danger of forfeiting this actual cash is a greater incentive to the fulfilling of the contract by the contractor than the bond. Thus, instead of compelling a contractor to make such a large bond for the entire life of the contract, it could be stipulated that a bond for a nominal amount only be made, to run until the retained percentage reaches a specified amount, or for half the life of the contract, when the forfeiting of the percentage will act as security for the contractor doing his work. This, with equitable specifications, will reduce the cost of the bond and thus reduce to some extent the total cost of the work. Fair and equitable contracts and specifications mean not only cheaper construction but also that a contractor can be held to his work more easily. Such forms of contract and specifications, in themselves, are a good bond.

The writer knew of one contract that called for the holding of only a percentage of the monthly estimate, until a specified sum was in the company's hands, when the estimated sums were paid in full. A contractor figuring on that called for both a bond and a large retained percentage.

that caled for both a bond and al arge retained percentage.

Bonds with penalty clauses are always expensive, and in case of any dispute, even where they state that the amount forfeited is in the nature of liquidated damages, the courts look with disfavor on such contracts and bonds, and actual damages must be proved to have been incurred before the courts will allow them. So it is with contracts with both bonds and forfeit clauses. When it is necessary to have such contracts, the bonds should be made the same amount as the penalty, and not less, as is too often done.—The Contractor.

Can Enamelled Metal Culverts be made Commercially Successful

There are many engineers who labor under the misapprehension that what is most durable is necessarily most economic in the long run. This fallacious idea exists largely because many engineers have not been thoroughly taught the essential principles of engineering economics, says Engineering-Contracting. A wooden trestle is frequently the most economic form of railway or wagon road bridge, in spite of the fact that its life may not exceed 10 or 12 years. Money at 6 per cent. compound interest doubles itself in 12 years. Hence if an everlasting bridge of some material other than wood cannot be built for less than double the cost of the wooden bridge, it is not usually true economy to build the everlasting bridge. This holds true in any community where money is worth 6 per cent. to the average taxpayer, for if the excess cost of the everlasting bridge were loaned at 6 per cent. interest, it would yield enough interest to rebuild the perishable bridge in 12 years' time and still preserve the principle intact.

The same reasoning holds good of culverts. Throughout the far west timber culverts have been extensively used in years past, simply because engineers perceived that true economy was often obtained by using a cheap though perishable material. Within more recent years, corrugated iron culverts have sprung into popularity, because their low first cost and rapidity of construction made them the most economic form of culvert under certain conditions—not merely most economic in first cost, but most economic after making due allowance for depreciation and interest on investment.

In culvert construction there is also a factor that every experienced road and railway engineer appreciates, namely the difficulty of estimating the proper size of culvert opening. How often does it happen that not enough water ever passes through a culvert to fill one-quarter its area of cross-section. And, on the other hand, how often is a culvert flooded by the first heavy rain, and embankments badly eroded because of inadequate culvert capacity. So often do such things occur that an experienced engineer realizes it to be frequently economic to build as cheap a culvert as possible, if only to use it to ascertain what size of culvert opening is needed. After all has been said that can be said of formulas for predicting the run off from a given area, there remains the fact that they are only engineering guesses. Hence the need of experimental data in every locality to determine the run off after heavy rains or thaws.

For these reasons, even if a corrugated iron culvert were as short lived as wood, it would merit extensive use. But there is reason to believe that such culverts when made of pure iron, and well galvanized, have a life that is by no means short. Extensive experiments made by Mr. Allerton L. Cushman, now of the Institute of Industrial Research, Washington, D.C., and formely in the service of the government office of public roads, resulted in proving that the rusting of steel and iron is due primarily to galvanic action between the iron and other elements contained in it. Having proved this fact, the obvious method for preventing rusting was to use as pure an iron as possible and to coat it heavily with a non-oxidizing material. Certain manufacturers were quick to grasp the commercial value of this fact, and, accordingly, we have the non-corrosive, galvanized, corrugated metal culvert.

It is not unlikely that still further improvements in the art of metal preservation will add still more to the durability of this type of culvert. For example, why is it not commercially feasible to enamel the metal instead of galvanizing it? The cost would be increased, but would not the added life justify the added cost? A well-known bridge engineer recently expressed the opinion that within a few years practically all bridge steel would be enamelled. Already a part of the floor system of a steel bridge has been built of enamelled steel sections, and at a cost that is by no means prohibitive.

It is our belief that an enamelled metal culvert can be made that will be even more widely used than the galvanized metal culvert, and that both types will have their particular fields of usefulness.

Primarily for the Building Contractor

Temporary Timbering in Concrete and Terra Cotta Construction (by Owen Maginnis)—Methods, Cost and Progress of New Work

In the construction of buildings in which concrete or terra cotta is largely used it becomes necessary to provide some form of framing to support for a short time the constituent materials and to act as guides for placing and regulating their exact position. This is generally accomplished through the medium of timber forms, or "false work," as it is sometimes termed. As an illustration we will take the matter of "Bucks," which, though they seem a comparatively simple detail, are yet one of the important and indispensible auxiliaries to work of this class. Observe, for example, Fig. 1, which illustrates the timbering for a doorway 3 ft. in width and 7 ft. in height. It will be seen that it consists of two side studs or uprights of spruce timber 3 in. thick and 4 in. in width, the latter dimension being the same as the thickness of the partition blocks which measure 9 x 12 in. and are 4 in. thick. This frame is topped by a head timber of the same size, intended to temporarily support a lintel spanning the opening.

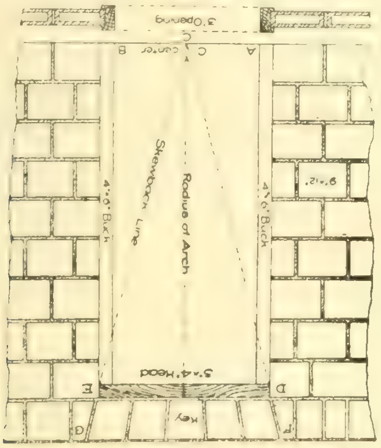


Fig. 1.—Timbering for a doorway 3ft. wide and 7ft. high.

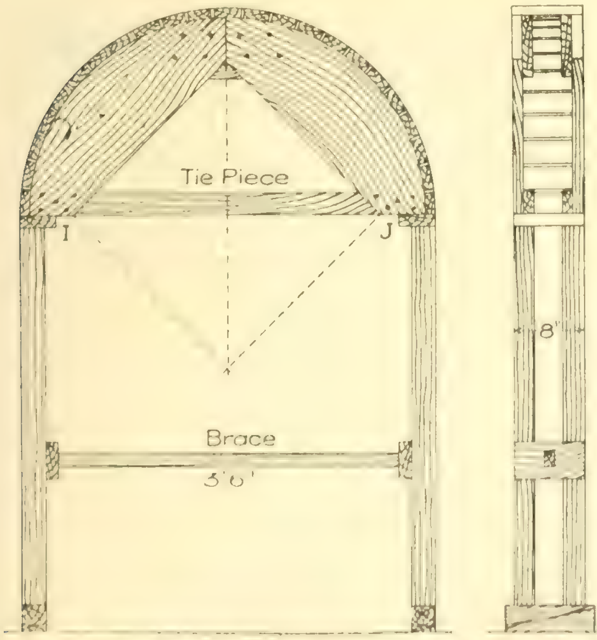


Fig. 2. Elevation and section of "centering" for semicircular opening

In order to maintain the blocks in true position both longitudinally and transversely they are set in grooved timbers, as shown by the plan in Fig. 1, or they have ⅞-in. strips nailed on the edges and projecting 1 in. so as to form grooves to hold the terra cotta fireproof blocks and "grounds" for the plastering. The head piece spanning the opening must be similarly formed, if acting as a lintel, always allowing for the key block, on which the whole stability of the lintel depends.

Perhaps, however, the opening may be topped by a curved head or one which is part of an arc of a circle, as indicat-

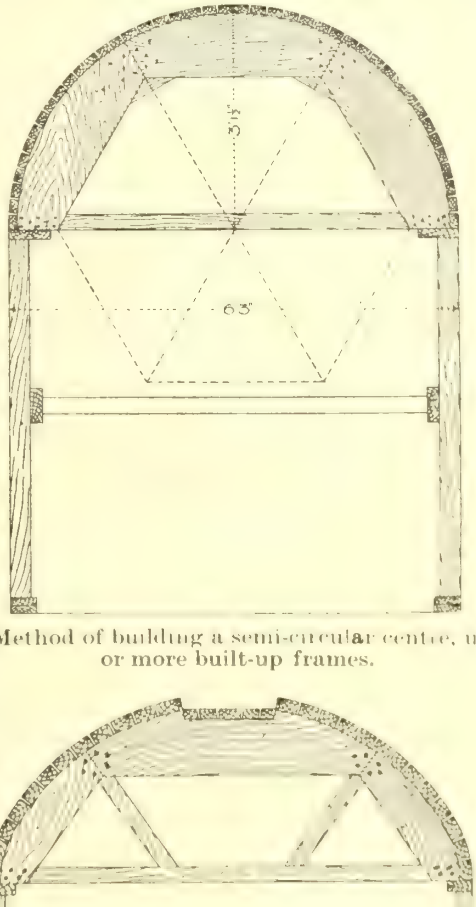


Fig. 3.—Method of building a semi-circular centre, using two or more built-up frames.

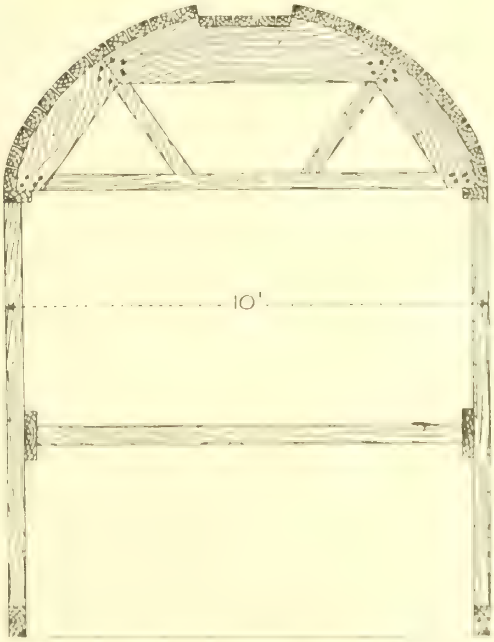


Fig. 4. An elliptical "form" for a wide span

ed by the dotted line in Fig. 1. In this case it will be necessary to ascertain the angle of the skew-backs, and to do this divide the width of the opening A-B into two parts and locate the centre as at C′ for the arc. Connect the points C′ and D, also C′ and E, producing these lines to F and G, respectively—the depth of one 9-in. block. By driving a nail at C′ the point is established for determining the radial joint lines of all the blocks to form the lintel or arch.

For a reinforced concrete lintel, boards or planks will require to be nailed on each side of the head buck D-E and wide enough to reach to its intended height. To prevent spreading apart it must be well secured with cleats on the top edges and the side bucks must be similarly treated.

For a semi-circular opening of moderate width it is usual to construct the centering or form after the manner indicated in Fig. 2, which represents an elevation and also a cross-section. The first important step is the measurements, and it cannot be too strongly emphasized at this point that these measurements must be accurate. The four bucks, studs or uprights, as they may be termed, must be sawn to the height of the spring line I-J less the thickness of the tie battens at the centre and the wedges at the foot. Assuming that the distance to this line is 6 feet, then each upright will be 5 feet 9½ inches—allowing 1 inch for battens and 1½ inches for wedges.

In setting, the top ends must be levelled across with an accurate spirit level, as there may, perhaps, exist inequalities in the floor levels. In the same way the measurements for the lengths of the horizontal braces cut in between to keep the bucks or uprights from opening or springing must be made. This may be done by deducting the thickness or measuring the distance between with two laths, holding the two with both hands and then sliding one lath upon the other until the end of each touches an upright—a method which, by the way, can be used for diagonals, heights or widths, as may be required, although the ends should be pared to chisel points when applied to angles.

In Fig. 3 is shown the method of building a semi-circular centre or "form" for a span, using two or more frames built up in sections of three pieces each end battened together with strips long enough to equal the thickness of the concrete or terra cotta wall. The frames are spaced about 4 in., 6 in. or 8 in. apart, according to the weight of the material to be carried.

Fig. 4 represents an elliptical form cut out or sunk at the apex for a key block, which evidently projects below the surface of the soffit. In this centre the timbers, on account of the wide span, must be heavy—not less than 3 in. in thickness—and it may be remarked at this point that it seems strange there has never yet been printed even by the most eminent authorities any fixed data in the way of figures or tables specifying the exact dimensions of timbers necessary for temporarily supporting different loads and materials for the several forms of arches. Most of these small arches in building construction are made by carpenters and builders from guesswork or practical experience. In engineering work the designers generally designate the forms, materials and sizes of the false work and centering, but in architecture and building it is, as a rule, left to the builders, for their best judgment and execution.

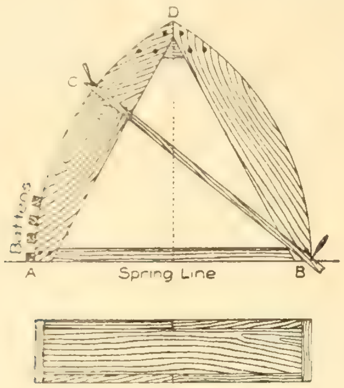


Fig. 5.—Method of constructing a simple Gothic "centre"

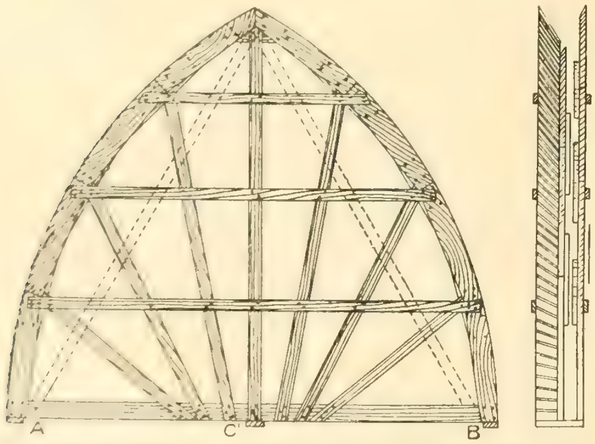


Fig. 6.—Elevation and section of Gothic centre for a 20 ft. span.

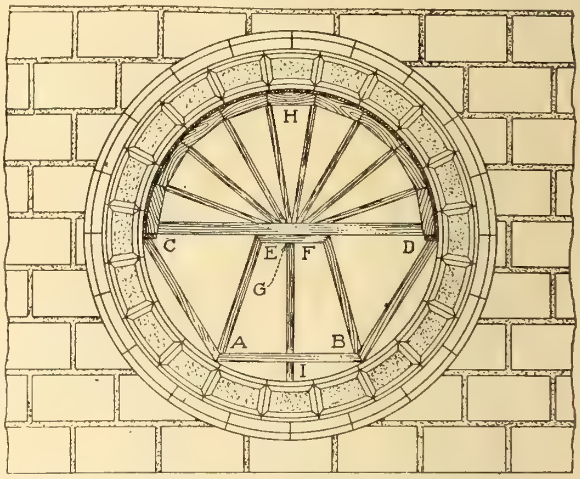


Fig. 7.—Temporary timbering for full circular window, piercing a thick wall.

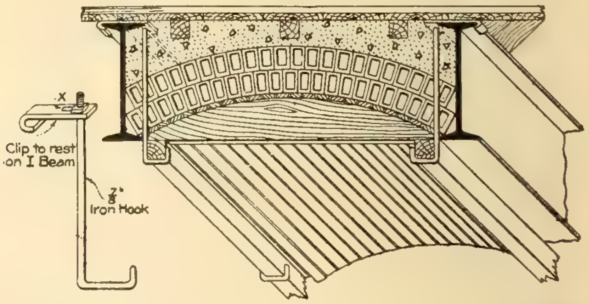


Fig. 8.—Method of supporting flat arches between floor beams when very deep, with view of clip and hook used for the purpose.

Boards for concrete "forms" can follow the curvature of the heads or be straight, provided they be wide enough to exceed the arch rings.

The views presented in Figs. 5 and 6 represent Gothic forms or centres, the first being comparatively simple in construction, but the second is well worthy of attention, as it represents a scheme which can be followed with safety in church building, either for concrete or terra cotta. Referring to Fig. 6, which represents the framework, or centre, for a 20-ft. span, the battens A and B rest on the topmost plates of the supporting columns, which are assumed to be placed 20 feet between centres. The soffit is bevelled to a V-shape, as shown by the vertical section. In a case which the writer has in mind there were three of these forms placed 12 inches apart, the centre one following the angle and being one-half less in height than that shown.

In Fig. 7 the reader will perceive the proper method of constructing a form of temporary timbering for concrete or terra cotta blocks for a full circular window, piercing a very thick wall. This framework ostensibly is intended to carry the semi-circular work above the diameter or centre spring line C-D. The invert below on the continuation of the soffit line C-A-B-D has been already made and set to the contour represented and placed in position in a full ashlar wall to a diameter on the line C-E-F-D of 18 feet, so that the upper semi-circle must be supported from the invert.

To do this the timber A-B, in compression, must be placed absolutely level with the ends sawn to the lines radiating to the centre G. The timbers A-C and B-D must then be cut and set, and afterwards the centre H-D constructed as shown.

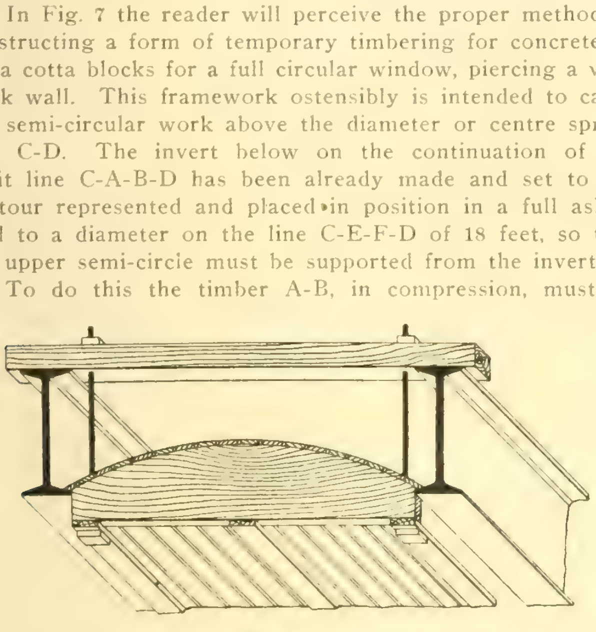


Fig. 9.—Two methods of temporarily supporting flat arches of concrete or terra cotta between floor beams

In the construction of all temporary timbering in building construction safety is, of course, the most important factor, so the forms must be o the best mechanical design in order not only to insure the safety of the men working on or around it, but to guarantee the positive permanence of the completed work. The timbers must be ample in size and at least three times as strong as necessary. They must also be properly placed, especially when they are in compression. All poor material should be thrown aside, the nailing should be thoroughly done and the work executed by skilled, conscientious and relaible mechanics. It should always be directed by a foreman or superintendent fully experienced in this special branch of building and who should make sure it is fully adequate for the purpose for which it is intended before being loaded. If these measures were adopted there would be far less records of accidents of collapses.—Building Age.

The Value of Concrete in Reducing the Cost of Insurance

At a recent meeting of the National Association of Cement Users of America, Mr. Emile G. Perrot gave the following particulars of the value of concrete in reducing the cost of insurance: "The large steel sprinkler tank and tower of the Victor Talking Machine Company, Camden, N.J., is an instance of the beneficial result derived from the use of concrete from an insurance standpoint. This tank holds 100,000 gallons of water, the bottom of which is 125 feet from the ground. The total height of tank and tower is 174 feet. The diameter of the tank is 20 feet. The tower is erected on filled ground near a river, and the foundations of the four legs are supported on concrete piles. By reason of the close proximity of buildings belonging to other owners, the Victor Talking Machine Company desired to take out indemnity insurance on the structure as originally designed—that is, without any concrete protection, so that in case of a fire in the buildings adjacent, and the collapse of the tower, the damage to adjoining property would be covered. This, they were informed, would cost $500 per annum. It was finally decided not to put any insurance on the structure, but instead to invest about $4,000 in fireproofing the tower with concrete. A little reflection will show that the investment fully pays for itself, not only financially, but by practically making the tower immune from fire and the destructive agencies of the atmosphere, which it would not be if left unprotected. If we charge against the tower the interest on $4,000 at 6 per cent. per annum we have $240 as the carrying charge for the absolute protection against fire, instead of a $500 charge for no absolute protection to person or property, but simply to cover any damages for which the company might be liable in case of a collapse of the tower. This clearly shows how it pays to carry your own insurance by taking precautions to avoid damage to persons or property by making a building fireproof. Further, the saving on the insurance premium will pay for the fireproofing in about 15 years, so that at the end of that time the original cost of the fireproofing will be wiped out. This, of course, is based on the assumption that insurance would be carried on the tower if it were not fireproofed."

Cost of Granolithic Finish in Concrete Floors

The following figures of cost for the finished surface of granolithic concrete floors are average results obtained by a Boston construction company during their long experience in laying this class of floor.

For a 1-inch finished floor surface laid integral with and at the same time as the structural concrete, finishers being paid 50 cents and laborers 20 cents per hour, costs figured for 100 square feet of finished surface:

Finishers' time	$1.00	to $1.30
Mixing and placing concrete		.42
Cement, 1 11/100 barrels	1.40	1.55½
Sand, 3½ feet at $1		.12
Fine stone, 3½ feet at $2		.25
	$3.19	to $3.64½

If laid after the structural concrete has set and not integral with it, the total cost of the floor will be about $1.50 more per 100 square feet. If finished surface is reinforced with ¼-inch steel bars 12 inches on centers to prevent cracking, add extra labor for mixing and placing concrete 40c., and extra labor finishing 30c., or 70c. per 100 square feet, and for placing steel, 50c. per 100 pounds, with cost of steel about $3 per 100 feet laid down

The city council of Victoria, B.C., are stated to be considering the appointment of a new city engineer. Six months ago Mr. Angus Smith, the present incumbent of the office, was re-engaged for a trial period. At a recent meeting of the council Mr. Smith recommended the appointment of Mr. S. H. Reynolds as [illegible]. This would appear to have brought matters to a head

Fine New Structure at Vancouver, B. C.

The Metropolitan Building, now being erected on Hastings street, Vancouver, west of the post office building and immediately adjoining the home of the Vancouver Club, is ten storeys high, of steel, brick and concrete construction, and will be one of the finest of the new blocks now under way or recently added to the city's already large list of big structures. For the Terminal City Club there has been built on the north end of the company's building a two-storey club building 90 x 100 feet, access to which will be made by the main Hastings street entrance through the palm room, 20 x 40 feet, to the foyer of the club, which will also occupy the following space in the main building: On the left of the palm room a ladies' reception or tea room, and on the right an office, telephone booth, corridor and staircase to second floor, and a private dining room. On the second and third floors of the main building the club will have twenty-two guest rooms, bathrooms and barber shop, access to which will be had only from the club premises. The main building, facing on Hastings street on the south and Burrard Inlet on the north, will contain 196 large offices, the rooms facing the north having a magnificent view of water and mountains.

Metropolitan Building, Vancouver, now under construction.

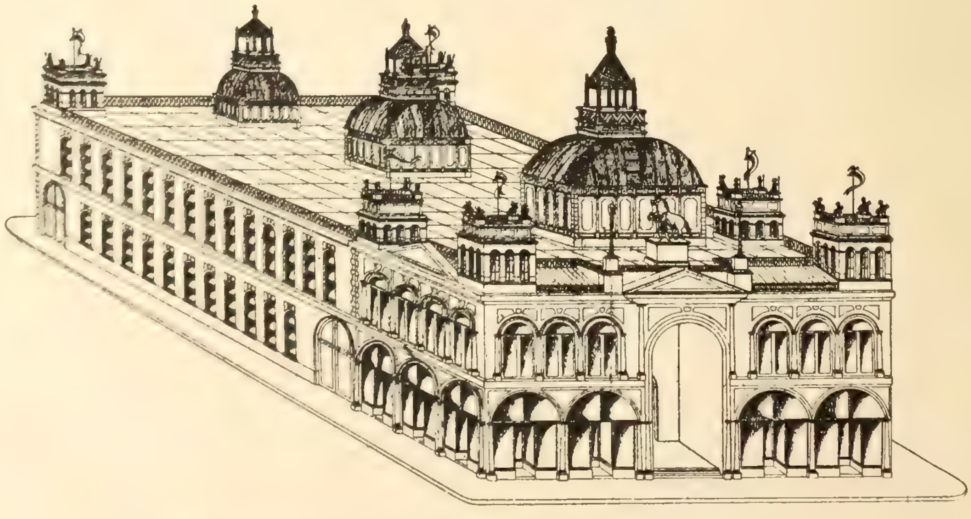
Each office is supplied with marble washstands, messenger and telegraph service, janitor service, electric light, steam heat, linoleum, electrical fixtures and other conveniences. The building will be equipped with three high-speed elevators, giving a continuous service day and night, Sundays and holidays alike.

The contracts for the building were let on the 24th of March, 1910, and the building will be entirely completed in about six weeks, at a cost, including the land, of about $500,000.

Plans Completed for Montreal Hippodrome

Messrs. Laferriere & Hurtubise, architects, Montreal, Que., have completed plans for the new Hippodrome, which is to be erected by a company capitalized at half a million dollars. The Hippodrome will accommodate 10,500 people and will contain a theatre and racing track. The roof will be of armored glass, which will not only serve to illuminate the interior, but will afford an excellent roof garden. The ground floor corners of the building will be occupied by stores. The construction will be of a very substantial character, largely of steel and concrete, and fireproof throughout, according to information furnished the Contract Record representative by Mr. Brosseau, the promoter of the enterprise.

Our Montreal representative informs us that the extension of the Place Viger Station of the C. P. R. is scheduled to be completed about the middle of June and that the alterations to the hotel are due to be finished early in July. With the approach of warm weather a large force of men has been put to work on this job and good progress is being made. The roof and skylights are finished, the partitions in the first floor are in place and the plastering is well under way. The brick work for the mid-way is being pushed up rapidly. The new bridge leading from Notre Dame street to the hotel and station will run at right angles to the viaduct between Berri and Montcalm streets and this is expected to be finished in the latter part of June. Mr. R. Graves, manager of the Viger hotel, states that from present indications this year's tourist season will be greater than any of its predecessors.



· The proposed New Hippodrome to be erected at Montreal.

Engineering "Expectancy" Keen at Ottawa

Report on Railway Entrances the Cause of Considerable Speculation —The Rideau River Problem—Late Spring Delays Building Season

Correspondence of the Contract Record

Ottawa, April 14, 1911.

There is a great deal of expectancy in Ottawa just now as to what is going to happen here in the engineering line within the next few years. The report of Engineer Tye and City Engineer Ker on the railway entrances into the city is one of the chief sources of speculation. The report recommends the closing up of the present Rideau canal at the deep cut about three-quarters of a mile from Central station and having all the railways come into the city by this way. The Grand Trunk already comes into the city along the southeast side of the canal and the C. P. R. comes in over the G.T.R. rails in this section, using the same station. The report suggests that the bed of the canal be used for the C.P.R. and other lines that in the future will desire to get into the centre of the city. From Central station there would be tunnels for both the G. T. R. and C. P. R. under Wellington street, to come out on the western side of the city, near the present pump house. The C. P. R. would thus connect with its lines to the west at the present yards at Union station. The Grand Trunk has a siding running into Booth's mills near this point and it would continue approximately along this siding and connect with its Parry Sound line west of the city. At present the Grand Trunk through trains come into Central station, then back out to Ottawa East and go west across the city. The suggestion is that this cross-city line be taken up altogether and the land bought by the city for a boulevard. The rest of the property could be sold for building lots, as it cuts through one of the best residential sections of the capital.

When the Rideau canal was first surveyed it was intended to run from Dowes lake on the southwest corner of the city almost directly north to the Ottawa river. The present report suggests that this connection be built now to come into the Ottawa river above the Chaudiere Falls. Here the harbor for the city would be built, connecting with the Georgian Bay canal which otherwise would not touch Ottawa, the government plans being for it to cut through Hull.

Providing, however, the government says that the Georgian Bay canal is not to be built, then the report recommends that the canal be left as it is and the C. P. R. lines brought into the city on its west bank with a tunnel through the city much as before but at a considerably higher grade.

As the government has committed itself to the Georgian Bay canal it is hardly likely that the alternative scheme would be necessary.

The plan is very nearly the same as the C. P. R. has proposed for some time and is therefore very satisfactory to that company. However, the G. T. R. is not so favorable, and its officials have promised another scheme which it is expected will be made public at an early date.

The proposal of the engineers has the strong feature that it will do away with the necessity of a great deal of expensive bridge building.

Another important engineering proposal is to prevent the Rideau river from flooding its banks in New Edinburgh and Eastview. At present the river overflows every spring. The bottom of the river is very uneven. It has a series of small lakes which are separated by very shallow rapids. The bottom of the lakes are much lower than the bottom of the rapids between. During the winter the anchor ice lodges in these shallow spots and blocks up the river, and since its banks are very low it overflows in the spring, doing a great deal of damage. A former plan prepared for the government was to dredge out these shallow spots which would, no doubt, have been effectual in stopping the floods, but would have drained the lakes in the summer time, entirely spoiling their present beauty. The present proposal, according to a plan prepared by Mr. N. Cauchon, consulting engineer for Hon. Charles Murphy, is to build embankments on each side of the river and to construct a dam at Porter's Island, a short distance from the point where the Rideau river flows into the Ottawa. The level of the river would thus be raised ten feet and in the winter would freeze over at this level. When the spring freshets came the water would be drawn off under the ice through sluices in the dam and there would be no lodging of anchor ice. The embankments would be converted into beautiful driveways. However, this would have to be constructed directly to the Ottawa river, via MacKay lake, to drain this area.

Building Season Late

The late spring has greatly retarded building operations in the city. The heavy expense of building foundations and excavating in the cold weather has resulted in most of the smaller buildings being postponed. However, during the latter part of the week operations were much more active and the rush on account of the weather delays will be all the greater. The prices of building materials are very much the same as for some months past. The prices of cut stone will advance about 5 cents per lineal foot as the result of the previously announced advance in wages to stonecutters.

The agreement existing between the builders and builders' laborers expires on May 1st, and at the last meeting of the Builders' Exchange a communication was received from the laborers asking for another agreement, but not specifying any terms. Accordingly a meeting of the builders and laborers will be held very soon, when it is expected that an amicable arrangement will be made.

McFarlane & Douglas will erect a large addition to its factory on Slater street. It will be solid brick, two storeys high and 141 feet by 66 feet. J. A. Ewart is preparing plans. In this building steel work such as fireproof doors, safe cabinets, lockers, etc., will be manufactured. At present, it is claimed, no firm is manufacturing these articles in Canada.

Mr. Jno. R. Booth, the industrial wonder of the Ottawa Valley, recently celebrated the 85th anniversary of his birth by a hard day's work at Chaudiere, starting in at an hour when two or three younger generations were still asleep. Mr. Booth was born at Waterloo, Que., on April 5, 1826. He went to Ottawa 50 years ago and commenced his business career with a small shingle mill at the Chaudiere. One of the enjoyable features of the annual convention of the Canadian Society of Civil Engineers held at Ottawa last year was a visit to the great industry over which Mr. Booth now presides.

The Western Bridge & Equipment Company, of Chatham, Ont., are applying for a charter to change their name to the Chatham Bridge Company, Limited. The capitalization will be $200,000. They have obtained from the city a free site of seven acres and a fixed assessment for ten years. The erection of a new plant, 82 by 200 feet, of steel and concrete construction, will be commenced at an early date.

Canadian Railroad Development

J. H. Knight, of the Valley Construction Company, [illegible], has secured a contract for several miles of work on Vancouver Island and will commence operations there immediately.

The Grand Trunk Railway has ordered 40,000 tons of steel rails from the Sydney, Cape Breton mills, to replace 200 miles of its tracks in Western Ontario. The company will ship 209 miles of the displaced track to the west for yards and sidings on the Grand Trunk Pacifis. Some of these rails have been in use since 1869, having been imported from England.

Engineers of the Canadian Pacific Railway are now preparing a route which will give that road an entrance into the downtown section of London, Ont. At present the company's station and freight sheds are in the north end. To secure a downtown station the company plans to build from Pottersburg to the city, and connect with the Pere Marquette, which has running rights into the Grand Trunk station. All the big factories are at the south end of the city in the district in which the Canadian Pacific Railway spur is proposed.

The Grand Trunk Pacific Railway (B. B. Kelliher, chief engineer, Winnipeg, Man.), has awarded extensive contracts to J. D. McArthur, Winnipeg, Man., and Foley, Welch & Stewart, St. Paul, Minn. The McArthur contract calls for the construction of branch lines: Foley, Welch & Stewart will be engaged in work between Prince Rupert and Edmonton, doing grading at both ends. The following branch lines are to be constructed: Calgary branch, 143 miles; Battleford branch, 59 miles; Melville-Regina branch, 68 miles; Alberta coal branch, 68 miles; Regina-Boundary branch, 110 miles; Moose Jaw branch, 49 miles; Prince Albert branch, 72 miles; Biggar to Calgary, 50 miles. In addition to this work on the branch lines, it is expected that 265 miles of new work will be done on the main line. On the line west from Edmonton there will be built 165 miles, and on the line east from Prince Rupert 100 miles will be built. On the branch lines the road into Calgary will be completed. At the present time there has been built of this branch 80 miles. The balance comprises 143 miles. Connection with Battleford will be made through the construction of a line from Oban north. The line into Regina from Meelville on which work has been done for the past two years will be completed. In the far west a line will be built into the coal fields from Bickerdike and will be known as the Alberta coal branch. In southern Saskatchewan two lines will be built, one from Regina to Moose Jaw, and one from Regina to the international boundary. On the latter grading was done last year, but the former project is one on which nothing has yet been done. Farther north in Saskatchewan work will be done on two lines, on the road from Biggar to Calgary and on the road from Young to Prince Albert. On the former 50 miles will be built, and on the latter 72. In connection with the construction of these lines it will be necessary to do important bridging. Among the rivers which are to be crossed are the Skeena, the Athabasca, the Red Deer, and the Prairie Creek. The total cost of the construction of these lines is stated to be in the neighborhood of $17,000,000.

U. S. Steel Company in the Canadian Field

Mr. J. H. Plummer, president of the Dominion Iron and Steel Company, and Mr. M. J. Butler, general manager, were in Ottawa last week interviewing the members of the government in a final effort to secure a temporary extension of the bounties on wire rods, which expire on July 1st next.

Mr. Plummer states that with wire rods placed on the free list, under the reciprocity proposals, the Canadian manufacturers are left with absolutely no protection against the United States Steel Company, which can dispose of its surplus product in Canada at cost or less than cost price. There being no duty there can be no application of the "dumping clause," and already, he states a contract is being made at Hamilton for the laying down of steel rods there from Pittsburg at a price considerably lower than the American market price, and with which the Dominion Iron and Steel Company could not possibly compete except at a loss. He maintains that if a temporary extension of the bounties on wire rods for two years were given it would enable the company to gradually convert its present wire rod plant into a mill manufacturing some other form of iron or steel, which they could produce profitably in competition with the United States Steel Company.

Personal News and Notes

Lynch & Gangysh have opened a stone yard at Saskatoon.

McKee & Cruickshank, general contractors, of Red Deer, have dissolved partnership.

William P. Coleman, architect, has opened an office at 406 Northern Block Building, Regina.

Peterson & Par, engineers and contractors, of Vancouver, are reported to have dissolved partnership.

J. L. White, of Siouix City, S.D., is in charge of the installation of a water system at Melville, Sask.

The Canadian Equipment and Supply Company, of Calgary, has increased the capital stock to $200,000.

The Sandstone Brick and Sewer Pipe Company, Limited, of Calgary, has obtained a charter.

Mr. W. J. Laughlin, contractor, Chilliwack, B.C., has been appointed building inspector for that city.

Over four hnudred thousand dollars worth of buildings will be erected in Vernon, B.C., this year.

W. W. Blair, architect, of Winnipeg, was at Nelson recently inspecting the new C. P. R. hotel.

Farelly Bros., contractors, of Winnipeg, have incorporated with a capital of $20,000.

The Canada Metal Company will establish a branch of their business at Winnipeg.

Harvey & Moorehouse, engineers and surveyors, of Kelowna, B.C., have opened an office at Penticton.

The North Battleford Concrete Company will begin the manufacture of cement blocks and pipe as soon as spring opens.

F. A. Ross has commenced business in wholesale building supplies in Room 4, Masonic Temple Block, Prince Albert.

Messrs. Hotson and Leader, contractors and builders, of Lethbridge, have opened an office in Medicine Hat, of which T. J. Dupew will be local manager.

Enormous deposits of gypsum have been discovered near Spatsum, B.C., on the main line of the C. P. R., and a large refinery will be established there.

In a fire at Albernie, B.C., the headquarters office of Janse & McDonnell, railroad contractors, was burned. The loss was not a serious one.

C. K. MacLean, landscape architect, has just completed a comprehensive scheme for the beautifying of the public parks at New Westminster, B.C.

Employees of the Hamilton Bridge Company have commenced work on the new steel bridge which is to span Coal Creek, near Fernie, B.C. The old bridge is being torn down.

The Dominion Tar and Chemical Company, the capital of which has been furnished by English capitalists, is building an extensive plant about six miles east of Winnipeg, and a mile straight north of the Transcontinental shops. F. W. Coates is the manager in charge. The plant will cost in the vicinity of $200,000. The work of the new concern will consist wholly of creosoting wood for preservation purposes.

Mr. H. G. James, architectural engineer, has opened an office on Magog street, Sherbrooke, Que.

The Grand Trunk Pacific plan the expenditure of $17,000,000 in Western Canada this year. Of this amount Regina and district will come in for a good share.

The Board of Water Commissioners of St. Thomas, Ont., have retained Mr. Jas. A. Bell, formerly city engineer, as consulting engineer.

Loring P. Rixford, of San Francisco, has been awarded the first place in the plans for the new Union Club building to be erected on Humboldt and Gordon streets, Victoria, B.C.

H. K. Agnew, sales manager of the Hanbury Manufacturing Company's Brandon branch, has resigned to take a similar position with the North Pacific Lumber Company, of Burrard Inlet, B.C.

At Calgary, Alta., excavating is proceeding apace for the new stores to be erected by the Hudson's Bay Company. A photograph just to hand shows nearly a score of teams on the job.

Mr. Geo. T. Dodge, late of the Department of Public Works, St. John, N.B., was married recently at Fredericton, N.B. Mr. Dodge will reside in Montreal, where he will follow his profession of civil engineer.

Negotiations are being conducted by the Canadian Northern Railway and the British Columbia Steel Corporation, capitalized at $10,000, for the location of a big steel plant at Port Mann. Work will be commenced at once.

The organization of the Medicine Hat Builders' Exchange has been completed. Mr. John Trimble was elected president; Mr. E. A. Forrester, vice-presidnet; and Mr. J. D. Everard secretary-treasurer.

The provincial government of British Columbia will expend over four million dollars this year for roads, bridges, wharves, public buildings and other improvements. Of this sum Vancouver Island will receive nearly half a million.

Messrs. Vickers, Son & Maxim, the English shipbuilding firm, deny the report that they have received any contract from the Canadian government other than for establishing a repairing dock at Montreal.

C. W. Dean, of New York, formerly of Winnipeg, died last week of heart disease. In western Canada the late Mr. Dean had acquired a considerable reputation as a contractor for C. P. R. bridge work.

Mr. Ernest Anson, a well known civil engineer, of London, Eng., and for many years prominently identified with important railroad construction in India, was a visitor to Edmonton, Alta., last week. Mr. Anson left later for Saskatoon, where he remained for two or three days.

Canadian Pacific Railway officials are discussing a project to extend Granville street, Vancouver, through the present station out to the Inlet, on steel and concrete arches, for the purpose of having a direct connection between the street and the big passenger steamers.

A noteworthy building project in British Columbia is the extension of the Parliament buildings at Victoria, upon which the provincial government will spend a million dollars. Mr. F. M. Rattenbury, architect, Victoria, is at work on the plans.

The threatened strike of the Lethbridge building trades, resulting from the declaration of open shop by the Builders' Exchange, has blown over, and all the various units are at work. Building operations have resumed their normal level and a busy season's work is in prospect.

With a view to showing the activity in municipal circles at Vancouver, B.C., a local paper figures that the city is expending $500 an hour for labor, irrespective of the pay roll for contract work, which is nearly as heavy as during the busiest period of last year.

Ald. John Clark, of McDiarmid & Clark, Brandon, Man., was the successful bidder for the construction of the new Hospital for the Insane, to be erected at Brandon. Mr. Clark's tender was $454,878, this being the lowest. Six other bids were received, of which the highest was $529,000.

F. T. Wilson, resident engineer for the C. P. R. at Vancouver, has resigned his post in order to engage in private practice in that city. Thos. Lees, resident engineer at Brandon, Man., will succeed him at Vancouver, while V. J. Melsted, Winnipeg, will succeed Mr. Lees as resident engineer at Brandon.

The British Columbia Marine Railway, of Vancouver and Victoria, is making preparations necessary to enable the company to tender for war vessels to be constructed for the Canadian navy. A dry dock 900 feet long and 100 feet wide, to cost $3,000,000, will be built at Esquimalt, with a modern shipyard in connection. A well-known Clyde shipbuilding firm is interested with the Marine Railway Company in the big project.

"Kiton" Soluble Coal Tar for Waterproofing Damp Walls

There has just been placed upon the Canadian market a tar preparation called "Kiton," which is obtained by subjecting coal tar to a physical process, through which it is rendered soluble in water. All the characteristics of tar are retained in this preparation, which when diluted with water is readily applied to any surface, as easily as ordinary paint. As a preservative Kiton has a wide sphere of application, but it is particularly well adapted and valuable for the waterproofing of large areas, such as extensive foundations, tunnels, waterworks, roofings, floors, and so on. In ordinary building work, for the waterproofing of stone, brick, cement and plaster walls, and particularly for cellars, it is invaluable.

The manner in which Kiton is used is simplicity itself. According to the thickness of the coat required one part of Kiton is dissolved in one or two parts of cold water. After thorough stirring, preferably with a stiff brush, the solution is ready for use. The solution can be thinned down sufficiently to be used with a sprayer, particularly advantageous in larger work, but for whatever purpose Kiton is required the work of tarring can be done more expeditiously and economically than with ordinary coal tar, dispensing entirely as it does with the troublesome and often dangerout tar kettle.

The instant the applied coat of Kiton is dry it is insoluble, impervious to moisture and weatherproof. Unlike ordinary tar it will never "run" when exposed to the heat of the sun. This unique preparations has met with instant and unqualified success in Europe since it was first introduced, some two years ago. Kiton will undoubtedly find a large field of usefulness and a ready market in Canada, where builders and contractors will be quick in taking advantage of its many time and labor-saving qualities.

For further information, prices, delivery, etc., apply to F. P. Mansbendel, General Distributor for Canada. His temporary address is 212 Huron street, Toronto, Canada See also advertisement in this issue

Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brockville, Ont.

Tenders are called until April 20th for supply of lumber for sidewalks and street purposes; Portland cement; salt glazed vitrified sewer pipes; sand, and cut and steel wire spikes. J. A. Mackenzie, chairman, board of works.

Chilliwack, B.C.

T. F. Sinclair's report on sewerage system, etc., estimates the cost at $67,-800, which includes work, material, supplies and guarantee. The scheme proposed by Mr. Sinclair is a flush vacuum system and about 5¼ miles of piping will be put down for the price mentioned. Steps will be taken to ascertain if privileges can be obtained from the government to empty the refuse in the Fraser river. If this is received then measures will be formed and a by-law submitted to the ratepayers. The work of installing a sewerage system and the macadamizing of the streets can go on at the same time.

Collingwood, Ont.

Tenders will be receiveed by K. S. Macdonell, town engineer, up to May 3rd for paving of streets throughout the town. For further particulars see advertisements in "Tenders and For Sale Department" of this issue.

Coquitlam, B.C.

The by-law to raise $150,000 for new roads was carried. The by-law to raise $50,000 for sidewalks also carried.

Edmonton, Alta.

Orders to make a thorough test of the asphalt found in the north and to bring out two tons of the material for this purpose have been received by F. B. Cream, who is exploring in the McMurray district this summer for the government. The department of the interior has sent out the orders and it is stated that the asphalt would be turned over to the experts of the United States for a thorough examination and report.

Fort William, Ont.

Tenders are called until May 4th for paving with asphalt block, sheet asphalt, or bitulithic, etc. Plans, etc., at office of City Engineer John Wilson. Advertisement in "Tenders and For Sale Department" of this issue.

Hamilton, Ont.

Tenders addressed to Geo. H. Lees, chairman, board of control, will be received until April 19th for the brick setting for five boilers to be installed at the Beach Pumping Station. S. H. Kent, city clerk.

London, Ont.

The local improvement committee of the city council are outlining a scheme for extensive pavements. Reports on the various kinds will be considered in regard to the various foundations on which they will be laid on the different streets. Ald. Richter, chairman.

Tenders will be received by the Board of Water Commissioners, London, to April 27th for waterworks supplies, including brasswood, lead pipe, iron pipe, iron castings, stop cocks, boxes, steel hydrants, valves and valve chambers. H. J. Glaubitz, general superintendent. Advertisement in "Tenders and For Sale Department" of this issue.

Melville, Sask.

A by-law to raise by way of loan $63,-000 for construction of waterworks, etc., will be submitted to the ratepayers on April 25th; also that for $5,000 for construction of storm sewer, etc. R. B. Taylor, mayor; John Crow, secretary-treasurer.

Moncton, N.B.

Tenders for new sidewalks to cost about $9,000 will be asked shortly. Engineer McBeath in charge.

Montreal, Que.

Tenders for the construction of Montreal's filtration plant will be called for within the next two weeks. It is expected that the tenders will have been awarded by the end of next month, and the work involving an expenditure of two million dollars, is to be completed in September, 1913. There are four contracts to be let. In the first place ten pumps will be provided, and after that the pre-filter and the main filter will be under contract, as well as the concrete covering over the filter beds, as the water, while in the process of being filtered, will not be exposed to the air.

Moose Jaw, Sask.

The following tenders were received for pumps, sewer and water extension, sewerage disposal plant, etc.:

Sewage Disposal Works — Manders Bros., Edmonton, $124,023; Geo. H. Archibald & Co., Winnipeg, $129,500; Flanigan & Murphy, $134,585; Navin Bros., Moose Jaw, $143,713; Moose Jaw Construction Co., $149,641; City Engineer, $146,306; Simple Concrete Piling & Construction Co., $139,000.

Sewage Pumps—Canada Foundry Co., Toronto, $1,960; John MacDougall Iron Works, Montreal, $2,281; The Canada Land Co., Ltd., Montreal, No. 1, $4,615.-24; The Canada Land Co., Ltd., Montreal, No. 2, $4,249.74; Canada Ford Co., Montreal, $4,825.

Supplying Cast Iron Pipe—Stanley Brock, Ltd., Winnipeg, $39.25 (6 inch), $39.25 (4 inch); G. Thompson Pipe Foundry, $40.00 (6 inch), $40.00 (4 inch); Francis Hankia & Co., Montreal, $41.40 (6 inch), $41.95 (4 inch); H. A. Drury & Co., Ltd., Montreal, $43 (6 inch), $44.-05 (4 inch); Moose Jaw Machine Works, $45.77 (6 inch), $47.31 (4 inch); Whitlock & Marlatt, $45.50 (6 inch), $47.50 (4 inch); Chas. Miller r Co., $45.60 (6 inch), $45.60 (4 inch); S. D. Wood & Co., $18.25 (6 inch), $21.00 (4 inch); R. Cunningham, $50.47 (6 inch), $50.47 (4 inch); Canada Foundry Co., $42.50 (6 inch), $42.50 (4 inch); Bissett and Loucks, $45.00 (6 inch), $45.60 (4 inch).

Sewer and Water Extensions—Navin Bros., Moose Jaw, $51,113; L. W. Schruth, Fargo, N.D., $56,519; C. J. Robinson, Moose Jaw, $52,774; H. G. McVean, Moose Jaw, $54,740; Flanigan & Murphy, Moose Jaw, $58,800; Ransom & Kilkenny, Moose Jaw, $63,000; C. J. Townsend, Toronto, $60,000; Mudies Bros., Edmonton, $66,917.75; City Engineer, $55,743.

Sewer Pipe—Dominion Sewer Pipe Co., $12,937.70; Saskatchewan Glass & Supply Co., $13,832.12; Whitlock & Marlatt, $13,531.18; Macomb Sewer Pipe Co., $14,597.24; Hamilton and Toronto Sewer Pipe Co., unit prices; D. F. Lee, $13,-592.17; R. Cunningham, $14,890.28.

Ottawa, Ont.

Tenders are called until April 27th for construction of the West End Drainage System. N. J. Ker, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Perth, Ont.

Tenders will be received up to April 28th by Jno. A. Kerr, town clerk, for construction of various sewers in the town of Perth. Advertisement in "Tenders and For Sale Department" of this issue.

Saskatoon, Sask.

Tenders will be received by the city commissioners up to April 28 for laying of water and sewer mains in the city of Saskatoon. Commissioners: Jas. Clinkskill, W. B. Neil, E. M. Snell. Advertisement in "Tenders and For Sale Department" of this issue.

Toronto, Ont.

Tenders addressed to the chairman, board of control, will be received until June 6th for supply of pumps, vertical electrically driven; motors and other electrical equipment; screens; and cleaning apparatus; venturi meters. G. R. Geary, mayor.

Victoria, B.C.

Under the newly elected council the paving programme for the year will at once be taken up and tenders called for the work to be done on a large number of streets. The creation of a large number of additional parks in various parts of the city; the Sooke Lake scheme, and the report of C. H. Topp, who has made preliminary surveys, will be considered. Arrangements will probably be made for the submission to the ratepayers of by-laws providing loans for the further extension of the sewerage system and the electric lighting plant, and altogether every effort will be made to advance with all speed those large works of improvement which were decided upon earlier in the year. About 600,000 yards of asphalt pavement will be built, tenders for 200,000 yards of which must be in by April 28th.

AWARDED

Berlin, Ont.
David Christner, Berlin, was awarded the contract for concrete storage tank, $1,571. H. Tomlinson, engineer in charge.

Calgary, Alta.
The contract for supply of road roller was given to Western Supply and Equipment Co., Ltd., Calgary, $2,448; that for asphalt plant to Bitulithic & Contracting, Winnipeg, $6,975. J. T. Childs, city engineer.

London, Ont.
The contracts for gravel, concrete tile, etc., were awarded as follows: Unscreened gravel—Section 1, Mr. Robinson, $2.60 a cord; section 2, W. J. Ross, $2.03; section 3, G. Alexander, $3.40; section 4, G. Alexander, $3.50; section 5, Mr. Robinson, $3.50; section 6, G. Alexander, $3.70; section 7, W. J. Boss, $$3,70; section 8, Mr. Robinson, $3.40. Concrete tile—8-inch, 16 cents; 10-inch, 18 cents; 12-inch, 20 cents. R. North, 14-inch, 40 cents; 15-inch, 50 cents. W. J. Anthistle, 18-inch, 60 cents; 22-inch, 60 cents; 24-inch, 70 ceents. R. North, 26-inch, 90 cents. W. J. Anthistle, 28-inch, 90 cents. R. North, 32-inch, 95 cents. W. J. Anthistle, 26-inch, $1. R. North, 39-inch $1.10. W. J. Anthistlee, 43-inch, $1.40. R. North, 45-inch, $1.50. Glazed tile—Hayman & Mills, 4-inch, 8½ cents; 6-inch 11½ cents; 8-inch, 18 cents; 10-inch, 27 cents; 12-inch, 35 cents; 15-inch, 47 cents. Junctions—4-inch, 35 cents; 6-inch, 50 cents; 8-inch, 75 cents; 10-inch, $1.15; 12-inch, $1.50; 15-inch, $2.75, and 18-inch, $2.50. The contract for cement walks was awarded to George Norton for 8½ cents, covering the whole city. Curbs and gutters were awarded to W. J. Anthistle for the whole city at 31 cents for 15-inch curb, 41 cents for 18-inch and 41 cents for 24-inch.

Renfrew, Ont.
Contract for the season's supply of cement was given to Mr. E. J. McGarry. The tender was at $1.55, in cotton bags, the bags to be returned.

Saskatoon, Sask.
The contract for cement sidewalks aggregating about 500,000 square feet, exclusive of curbing and amounting to over 12 miles, was awarded to Western Pavers, Limited, Winnipeg. The contract price was slightly over $90,000. The work is in charge of Charles Curtis, Winnipeg.

Vancouver, B.C.
Contracts for concrete sidewalk work in the six wards were as follows: Geo. W. Ledingham was awarded the contract for Wards 1 and 2 at 13 cents per foot, and Wards 3 and 4 at 13½ cents. McGarry & Cavanagh were awarded the contract for Wards 5 and 6 at 14 cents and 15 cents respectively. Boyd & Craig were awarded the contract for grading Broadway from Granville street to Trafalgar road, for $13,400. The grading and concrete work on Seventh avenue between Bridge and Scotia streets were awarded to R. McLean & Co., for $19,780. There were eight other tenders for this work with prices ranging from $19,986 to $25,900. J. B. Saint was given the contract for the grading of Graveley street, for $4,987.

Winnipeg, Man.
The contract for the construction of a wood-stave pipeline for the extension of the present feed mains of the water system to the new wells now being drilled to the north and west of the present wells, was let by the city engineer of construction.

Railroads, Bridges and Wharves

Bala, Ont.
The C. P. R. has asked for tenders for the construction of a drain 135 feet long, five feet wide and six feet high, for the diversion of a creek on the Muskoka line. Two miles north of Bala the line is carried across a muskeg by a trestle bridge, the safety of which was threatened by a creek running through the muskeg. The building of this drain will remove this danger.

Bayfield, Ont.
The Ontario West Shore Railway Co. is in negotiation with this municipality in connection with the proposed extension from Goderich here.

Dauphin, Man.
Tenders addressed to J. W. Johnston will be received until May 16th for supply of two 70 ft. bridges with 18 ft. roadway over the Vermillion river here. Specifications, etc., at the office of the above and at the office of the chief engineer, Department of Public Works, Winnipeg.

Fassett, Que.
Tenders are called by Public Works Department, Ottawa, until May 9th for construction of a wharf here. Plans, at this Department, and at the office of J. L. Michaud, District Engineer, Montreal, and on application to local postmaster.

Port Arthur, Ont.
It is stated on good authority that the Canadian Pacific will begin the double tracking of the line between Port Arthur and Fort William as soon as the weather will permit.

Regina, Sask.
The G. T. P. has purchased a strip of land one mile long and 200 yards wide, situated north of Belvedere subdivision, on which property the new shops will be located. The exact location of the station is at the corner of Albert street and 16th avenue.

Renfrew, Ont.
The by-law to raise $3,200 for construction of the new bridge on Smith's creek will be submitted on May 10th.

Trynor's Cove, N.B.
Tenders are called by Public Works Department, Ottawa, until May 9th for construction of wharf here. Plans, etc., with E. T. P. Shewen, Esq., District Engineer, St. John, N.B.; G. Stead, Esq., District Engineer, Chatham, N.B.; the Postmaster at Pennfield Centre, N.B., and at above Department.

Vancouver, B.C.
Tenders addressed to Mackenzie, Mann & Co., Ltd., will be received until May 12th for construction of the following sections: Hope to Boston Bar; Boston Bar to Lytton; Lytton to Ashcroft; Ashcroft to the crossing of the North Thompson river. Tenders will include clearing, grubbing, grading, bridges, trestles, culverts, masonry and fencing. Plans, etc., at the offices of the above, Room No. 29, 18 Hastings street west.

Virden, Man.
The C. P. R. will spend $50,000 here during the coming season in building a pipe line to bring water from the Assiniboine for the company's use. The line will be about five miles in length and necessary buildings will also be erected. The company is also arranging to build a steel bridge across the Virden creek.

Woodstock, Ont.
Tenders are called until May 6th for erection of three steel bridges, also for construction of concrete abutments for same. Tenders are also called for same date for construction of two or three bridges. F. J. Ure, county engineer. Advertisement in "Tenders and For Sale Department" of this issue.

AWARDED

Brantford, Ont.
Mr. H. M. Vanderlip, Cainsville, Ont., was given the contract for the construction of three concrete bridges; the Daubiguy Creek bridge, $798; the Lumler bridge, $565; and Wood bridge, $685; Mr. George Thompson, Paris, Ont., received that for the Wheeler bridge, $890.

Fork River, Man.
The contract for the construction of a Howe truss bridge across the Fork river, has been awarded to the Algoma Steel Bridge Company.

Port Arthur, Ont.
Stewart and Hewitson will probably be given the contract by the C. P. R. for the erection of permanent bridges, etc., east of here, amounting to about $60,000.

The Canadian Northern Coal and Ore Docks Co., Ltd., have let the contract to Barnett & McQueen Co. for the construction of an addition to the coal docks. The addition will have a capacity of 500,000 tons of coal.

Public Buildings, Churches, Schools, etc.

Annapolis Royal, N.S.
Tenders were called until April 15th for erection of church building. Plans, etc., at the Parsonage or at the office of the architect, Leslie R. Fairn, architect, Aylesford.

Brantford, Ont.
A building campaign has been started to raise $100,000 for a new Y. M. C. A. building.

Calgary, Alta.
The new building to accommodate the city stables, etc., will be erected at once at an estimated cost of $20,000.

The proposed Trades and Labor Building may be built at a cost of about $100,000. A joint stock company will be formed.

The new First Baptist Church will be erected at the corner of Thirteenth avenue and Fourth street west at a cost of $90,000. Architect, D. S. McIlroy.

Cobourg, Ont.
Tenders will be received by Neil F. MacNachtan, county clerk, Cobourg, Ont., up to [illegible] for [illegible] of Victoria Hall in Cobourg. For further particulars see advertisement in "Tenders and For Sale Department" of this issue.

Edmonton, Alta.
[illegible]

Plans may be seen at the office of H. A. M[illegible] Credit Foncier Building.

The provincial government have decided upon the erection of a large new land titles office, to cost about $200,000, at the corner of Howard and May streets. The new building will, it is understood, be much after the type of the new court house building. A preliminary estimate of $30,000 was made during the last session for the purchase of a site.

Forest, Ont.

Tenders are called until April 22nd for erection of 6-room school here. Plans, etc., at office of W. J. Porte, or at the office of the architect, R. W. Fawcett, Sarnia.

Fort William, Ont.

Plans for the new theatre to be constructed by Messrs. Hamilton and Fregeau, are complete, and work will begin in a few weeks. The theatre will be on the lines of the Walker theatre in Winnipeg and estimated cost is $85,000.

Montreal, Que.

Plans are being prepared by Mr. P. J. Turner for a proposed new Anglican Church at Montreal West.

Mr. Joseph Perrault, architect, 2106 Park avenue, Montreal, has completed the plans, specifications, etc., of the Postal Station "C," corner St. Catherine and Plessis streets, Montreal. The plans are at Mr. Perrault's office, and at Department of Public Works, Ottawa. Tenders are called until May 1st.

Ottawa, Ont.

Allan Keefer, architect, has prepared plans for a school to be erected by government at the Kootenay Mission, B.C.

Regina, Sask.

Tenders are being called for the Carnegie library here. Specifications call for alternative tenders for an all stone and a brick and stone building, fireproof construction throughout. It has been decided to install cork flooring. Estimated cost, $45,000.

Stratford, Ont.

At a meeting of the congregation of St. Andrew's Presbyterian Church the following were appointed to report on the question of the erection of a new church: Messrs. Thos. Ballantyne, J. H. Moffat, L. Oman, B. Johnson, B. Williams and J. A. Andrew.

Sudbury, Ont.

Plans are being requested for a skating rink here until May 1st. Advertisement in "Tenders and For Sale Department" of this issue.

St. Boniface, Man.

Under date of last information the contract had not been awarded for the new seminary here. Work will be commenced in May. The building will be of white Tyndall stone and is estimated to cost about $200,000.

St. John, N.B.

Arrangements are being made for the erection of the new theatre for Keith Theatre Co., New York. H. L. Watkins, general manager of the Keith circuit.

Toronto, Ont.

Ward One Liberal Association will erect a club house. President, Mr. George Strath.

The permit for the Women's Building on the Exhibition grounds has been issued, $60,000.

Tenders will be called by the Board of Education for the erection of a separate building for manual training and domestic science school at Manning avenue. Superintendent of Buildings, Mr. Bishop.

Negotiations are now in progress towards the disposal of the present site of the Queen street asylum and the securing of a site near the city for a new building which is estimated to cost about $150,000. Hon. W. J. Hanna, Provincial Secretary.

Vancouver, B.C.

The ratepayers of the municipality of Burnaby voted in favor of the $76,000 by-law for the purchase of school sites. It is possible that a new municipal hall will be erected this summer.

The architect for the new 7-storey building for the Bible Society to be erected on Howe street is Claude P. Jones. The building will be of steel and concrete construction with stone base and columns, the upper portion being pressed brick with stone trimmings.

Victoria, B.C.

Tenders are called for the erection of a school house at University School, Mount Tolmie. Plans and specifications can be seen at the office of John Wilson, architect, Pemberton Block.

Tenders are called by Department of Public Works until May 1st for the erection of a two-room frame school at North Cowichan. Plans at the office of the government agent, Duncan, and the Department of Public Works. J. E. Griffith, Public Works Engineer.

Windsor, Ont.

Tenders addressed to the secretary, board of education, will be received until May 1st for the heating of Cameron avenue school, either by hot water, steam or hot air blast. Plan of school at office of the above. Plans and specifications of system to be supplied by tenderer.

Winnipeg, Man.

Tenders are called until April 24th for erection of the Central Y. M. C. A. building. J. H. G. Russell, architect, McArthur building.

The congregation of St. Ignatius will erect shortly a large church on the northwest corner of Stafford street and Jesse avenue., Fort Rouge. Rev. Father Coffee, pastor.

The preliminary plans for the new court house were submitted to the Manitoba Bar Association by Provincial Architect Hooper. Estimated cost, $500,000. Work will commence as soon as plans have been finally revised.

The land for the new building for the Sisters of the Good Shepherd has been purchased in Kildonan. Estimated cost, $150,000. It is not stated just when work will commence.

The plans of Herbert B. Rugh, Union Bank Building, were accepted for erection of contagious diseases hospital to be erected in Riverview at a cost of $200,000. There were thirteen competitors, all of Winnipeg. George T. Teeter, Woodman and Carey, George W. Northey, Mathews & Maistre, also received prizes. Meyer J. Strum, of Chicago; John D. Atchison, and A. J. Douglas, M.D., acted as judges.

AWARDED

Brandon, Man.

The contract for the construction of the new central fire hall has been awarded to A. E. Bullock, $33,933. The price does not include plumbing, heating or wiring.

The contract for erection of hospital for insane was awarded to John Clark, of McDiarmid & Clark, local contractors, at $529,000. Six other tenders were received and ranged from somewhat about this amount to $529,000.

Brockville, Ont.

The Canadian Office and School Furniture Company, of Preston, Ont., has secured the contract of seating the new opera house.

Grand Forks, B.C.

The contract has been awarded by the Provincial government for the erection of the court house here to Mr. Robert Gaw, $40,000. The work of construction will begin forthwith.

Kamloops, B.C.

The contract for excavation for the new hospital building was awarded to Johnston & Co., of this city.

Moose Jaw, Sask.

The plans of W. Zimmerman were chosen for erection of 8-room school in the east end; for that of the 12-room school the plans of R. G. Bunyard were chosen.

Nelson, B.C.

The contract for the extension of post office has been let to John Burns, Nelson.

Oakville, Ont.

Messrs. Byers & Anglin, contractors, Montreal, have undertaken to construct a preparatory school here for forty pupils. Work will be proceeded with as expeditiously as possible. Messrs. Peden and McLaren, Montreal, are the architects.

Victoria, B.C.

The plans of Loring D. Rixford, of San Francisco, Cal., have been accepted for the 4-storey club house which is to be erected for the Union Club at Humboldt and Gordon streets at a cost of $150,000.

Welland, Ont.

The contract for the rebuilding and enlargement of the Presbyterian Church was awarded to the Builders' Lumber & Supply Co., $10,000.

Winnipeg, Man.

The contract for the addition to school here, fireproof construction, was awarded to R. J. Barker, 59 Pearl street, $84,000. Shepley Construction Company, Winnipeg, $85,000; John Saul, $86,945, Winnipeg, also tendered.

Residences

Brockville, Ont.

Tenders addressed to A. Stuart Allaster, architect, will be received until April 19th for erection of residence for I. Wright.

Chilliwack, B.C.

Permits were issued to the Western Home and Improvement Co., Ltd., two dwellings at $2,700 and two at $2,300, on Gore avenue; also on Second avenue, $2,300; First avenue, $1,400; total, $6,600.

Fergus, Ont.

Tenders are called until April 22nd for erection of stone house. Plans with

H. Ellis, Fergus, P.O. Separate tenders are asked for.

Montreal, Que.
Tenders will be received up to April 20th for alterations and additions to the residence of Dr. F. G. Henry, 146 Crescent street, Montreal.

Ottawa, Ont.
James Davidson will erect four detached brick houses on Wellington street which will cost about $24,000.

M. C. Edey, architect, is calling for tenders for a solid brick residence for John McKellar to be erected on McKellar's townsite. It will cost about $10,000.

Smith's Falls, Ont.
The Methodist Church here have under consideration the erection of a parsonage.

Vancouver, B.C.
Messrs. F. B. & Hugh E. Springer will call for tenders shortly for the erection of about 100 new residences, costing at an average, $2,000.

Winnipeg, Man.
P. C. Samwell is the architect in charge of the erection of the apartment house for J. E. Wilson.

Tenders addressed to J. H. G. Russell, architect, McArthur Building, were called until April 15th for erection of brick apartment block for Chas. Smith.

Tenders are called until April 22nd for erection of an apartment building for Messrs. W. F. L. and T. G. M. Orris. George T. Teeter, architect, 604 Builders' Exchange.

AWARDED

St. Thomas, Ont.
The contracts for erection of two new houses have been awarded by Architect J. T. Findlay, as follows: masonry, A. E. Ponsford; carpentry, E. Reath; roofing, C. Riddle; plumbing, C. Bull; plastering, J. Stewart.

Business Buildings and Industrial Plants

Chatham, Ont.
The plans for the American Pad & Textile Company's factory have arrived.

Fort Frances, Ont.
The C. N. R., it is reported, have prepared plans whereby they will establish their car shops here to care for the western system, including the line to Duluth.

Fort William, Ont.
Negotiations have been closed whereby the Northern Engineering Supply Co., of this city, J. M. Paton, manager, will have sole rights in Canada for the manufacture of the new Forest Lumber Loader. Albert Forest, of Duluth, is inventor and patentee. As soon as a suitable site is obtained a factory costing about $50,000 will be erected and the manufacture of the loader will be started at once. All work will be done in this factory with exception of the castings, which will be made by the Canada Iron Corporation.

The Canadian Northern Railway are having plans prepared for a new passenger station to be erected at western end of Victoria avenue on the main line. As soon as completed the old station on the "loop" will be abandoneed.

Kamloops, B.C.
Architect Parlett has prepared plans for a new 2-storey brick block to be erected on Victoria street for J. F. Smith.

P. Burns, of P. Burns & Co., Calgary, will erect a business building adjoining the Royal Bank building, which is to be erected at the corner of Victoria street and Second avenue.

Lethbridge, Alta.
Messrs. Monarch Bros., contractors, will erect two brick warehouses on property south of the present City Hall at an outlay of about $20,000. E. E. Carcer, architect.

Tenders were called until April 15th for the purchase and removal of the building occupying the site on which the Massey-Harris Company will erect their 3-storey warehouse. They hope to have the construction started soon after May 1st.

Montreal, Que.
The rumor is being revived that four new storeys will be added to the Jacobs Building, St. Catherine street, this summer.

Alterations are being made by Messrs. Simpson & Peel, contractors, to the St. Regis Hotel, which will provide a new grill room and ladies' reception hall.

Salada Tea Company is arranging to have extensive alterations made to their premises in St. Paul street. Tenders have been advertised for returnable on April 13th. The stimated cost is $20,000. Messrs. Peden & McLaren are the architects.

Plans are being prepared by Mr. Crighton for alterations to the premises at No. 10 Hanover street, the property of Mr. Charles Charters, which will provide stores on the ground floor and dwelling apartments above. Tenders must be in by May 1.

Stuart's Limited, bakers, are having an extensive addition made to their warehouse and stables on Rivard street. A three-storey structure 70 by 87 feet, of reinforced concrete, will be erected by George W. T. Nicholson, the plans for which have been prepared by Mr. D. J. Crighton.

Mr. George Ethier, contractor, is building a four-storey hotel with 76 ft. frontage by 38 ft. depth at the corner of Berri and St. Louis streets, for Mr. George Moreau. It will be faced with pressed brick and graded as second-class. The cost is estimated at $18,000. Messrs. Trudel & Gordon are the architects.

The corner of St. Catherine and Peel streets has been purchased by Carrick, Limited, for a syndicate who propose to erect a big hotel on the site. The property has a frontage of 111 feet on St. Catherine street, 170 feet on Peel street, and 113 feet on Dominion square. Messrs. Scroggie have a lease on the property, which expires on April 30, 1912.

Messrs. Brown & Vallance, architects, have the plans nearly completed for the new Herald Office Building at the corner of Craig and St. Alexander streets. Tenders will be called for this week. The building will be about 80 by 150 feet in area and six storeys in height. It will be of reinforced concrete throughout and modern in every appointment. The estimated cost is about $150,000

Ottawa, Ont.
The Geo. H. Mason Lumber Co. will erect a planing mill near here.

Horwood Taylor and Horwood are preparing plans for an addition to Topley Company's store, Sparks street.

McFarlane & Douglas will erect a solid brick 2-storey addition to their factory on Slater street. The extension will be 141 feet by 66 feet. J. A. Ewart, architect.

A block of stores is being erected for R. H. Millar on the corner of Bank and Roseberry avenue. It will be of solid brick and will have apartments. Alex. Christie is contractor.

Port Arthur, Ont.
It is stated that the Atikokan Iron Company will erect a foundry in connection with the furnace, for the manufacture of pipe and also enlarge their blast furnace. Superintendent, J. Dix Fraser.

It is stated with authority that the International Harvester Company, of Chicago, Ill., and Hamilton, Ont., will erect a large implement warehouse and assembling station. The main building will be 5 storeys in height and will be brick. The site chosen is a 400 foot frontage on the Kaministiqua river near C. P. R. Elevator "D."

Pilot Mound, Man.
The warehouse of the Dow Cereal & Milling Co. was destroyed by fire on the 11th inst. Estimated loss, $30,000.

Stickney, N.B.
The mill of the Peel Lumber Company was damaged on the 14th inst to the extent of about $30,000.

St. Remi, Que.
William Clark, Montreal, Que., will shortly have erected at St. Remi, Que., a packing plant and warehouse of considerable dimensions. The plans are being prepared by Messrs. Peden & McLaren, architects, of Montreal, and tenders will be called in a few days.

Sydney, C.B.
The Sydney Post, of Sydney, C.B., is shortly to have a new home. Messrs. Brown & Vallance, Montreal, are preparing the plans for the proprietor, Mr. S. J. McLennan, and tenders will be called for immediately.

Sydney, N.S.
A charter has been granted a company with a capital of $10,000,000 for a shipbuilding plant on Sydney Harbor. Sir Henry Pellatt, of Toronto, Lieut.-Governor J. M. Gibson, Messrs. Chas. Ellis, of Clyde Bank, Scotland; Alex. Gracie, of the Fairfield Shipbuilding Co., and A. Cross, of Sydney, are the incorporators. The company will carry on business under the name of the British-Canadian Shipbuilding & Dock Company.

Toronto, Ont.
Tenders are asked until [illegible] for all works in connection with the construction of a passenger station at Matheson. Architect, J. M. Lyle, Toronto. A. J. McGee, secretary-treasurer. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders are called [illegible] Temple Building until April 18th for the excavation, drain, concrete, brick, fireproofing and stone work (a portion of which has already been executed) in connection with alterations and additions to buildings for Geo. Lawrence, baker

Vancouver, B.C.

The [illegible] Steel Company secured the permit to erect a three-storey structure on Seymour street, $45,000. Niles & Fisher were authorized to build a four-storey block, costing $30,000 on Cordova street. Lee Yick Company a new building on Canton street, $16,000.

Victoria, B.C.

Tenders are called by the B. C. Land & Investment Agency, Ltd., for the removal of rubbish from the site of the Five Sisters' Block on Government street.

Dennis Harris, C.E., is authority for the statement that the building to be erected will be of the most improved type.

Walkerton, Ont.

The flour mills of Kent & Co. were destroyed by fire on the 13th inst. Estimated loss, about $14,000.

Winnipeg, Man.

Tenders were called until April 12th for erection of 2-storey brick block, Portage avenue and Kintyre street, for the Geo. Craig Co., Ltd., R. L. Smith, architect, 509 Builders' Exchange.

Czerwinski Box Company will extend their plant on Logan avenue at an estimated cost of about $75,000; plans have been prepared by Wm. Fingland, Portage avenue for a factory to cost $50,000 on Chambers street; Copp Sons & Co. will erect a brick building corner of Nena and Henry; The Imperial Oil Co. Logan avenue, will extend their plant, also the Canadian Bag Company.

AWARDED

Lachine, Que.

Mr. P. J. Turner, F.R.I.B.A., Montreal, has completed the plans for a new branch of the Molsons Bank at Lachine to cost $15,000. Mr. Louis Beaudry, of Outremont, is the general contractor. Messrs. Selkirk Bros. have the contract for the plumbing and heating. The Lachine Branch Bank will be constructed of pressed brick with Roman stone trimmings, and will be situated at the corner of Notre Dame street and Sixth avenue. Work will be started at once.

Montreal, Que.

McFarlane & Douglas, Ottawa, Ont., have been awarded the contract for the fireproof windows for the elevators being erected by the Montreal Harbor Commission, of which John S. Metcalfe is the general contractor.

The Atlas Construction Co. are the contractors for the new Timmens factory to be erected opposite their factory recently completed on Clark street, Montreal Annex. The new structure, like the other one, will be of reinforced concrete, the reinforcement being of the Mushroom design. The estimated cost is $54,000. Mr. P. J. Turner is the supervising architect.

Ottawa, Ont.

Holbrook and Sutherland have been awarded the contract for converting the store until recently occupied by J. Hope & Son, together with the one occupied by the Royal Bank, into one bank office for the Royal Bank. W. E. Noffke, architect.

George Crain has been awarded the contract of a commercial building for Kabil Farrah. It will be erected on the corner of York street and Market square. It will be 165 feet long and 54 feet deep. It wil have 10 stores, be two storeys high, and will cost about $30,000. W. E. Noffke is architect.

Victoria, B.C.

Murray & McKinney have been awarded the contract for the erection of the new B. C. Telephone Company's building on the corner of Blanchard and Johnson streets, $62,000. Work will begin at once.

The contract for the tearing down of the buildings occupying the site of the new Union Bank building at the corner of Trounce avenue and Government street, has been awarded to Messrs. Dinsdale & Malcolm.

Power Plants, Electricity and Telephones

Hull, Que.

It is understood that the extension of the Hull Electric Railway to Chelsea will be proceeded with this year. Preparatory to this the Hull Electric Company are building car sheds at Hull Junction which will cost about $25,000.

La Salle, Man.

At a meeting of the ratepayers of Macdonald municiplity for the purpose of discussing the advisability of securing a system of rural electric railroads throughout the country, the following were present: Reeve R. W. Wood, Oak Bluffs; H. Hohimier, La Salle, and H. H. Hinch, Winnipeg.

Ripley, Ont.

Tenders addressed to Angus Martyn, sec.-treas., will be received until May 11th for construction of a telephone system in the Tp. of Huron. Plans, etc., at office of the above.

Smiths' Falls, Ont.

The company which has been formed to construct an electric railway from Ottawa to Smith Falls and Kingston held a meeting and decided to conduct a series of meetings along the proposed route to get capital for continuing the work of organization and surveying. A. and B. Bruce are the engineers.

Toronto, Ont.

Tenders addressed to the Chairman of the Board of Control will be received until April 25th for supply of lightning arresters. Specifications obtained from the Toronto Hydro-Electric System, City Hall.

Winnipeg, Man.

The plans submitted by City Electrician Cambridge for the installation of lights across the new Arlington viaduct were approved and call for alternating ornamental lighting standards on each side of the bridge every 27 feet.

Miscellaneous

Calgary, Alta.

Recent building permits include: M. Healey, residence, $3,500, to be built in Mount Royal; Wm. Peacock, residence, $2,500, Fourteenth avenue; T. G. Whitehair, residence, $2,500, south side of Eleventh avenue; Dr. Wright, residence, $6,000, Centre avenue, Crescent Heights; J. Swanson, 1255 Keefer street, $6,500; Dissette & Fraser, 965 Thirteenth tvenue west, $4,000; W. J. Harrington, 1076 Seventh avenue west, $2,400; G. Ling, 770 Harris street, $2,500.

Hamilton, Ont.

Recent buildings include: R. Spicer, brick dwelling on Charlton avenue, for J. Dillabaugh, $2,500; R. G. Wilson, brick dwelling on Rutherford street, $2,200; R. G. Wilson, brick dwelling on Balsam avenue, $6,000; R. G. Wilson, brick dwelling on Beulah avenue, $2,200; R. G. Wilson, brick dwelling on Undermount avenue, $3,500; W. H. Northcott, brick dwelling on Mount Royal avenue, $2,500; W. H. Northcott, brick dwelling on Mount Royal avenue, $2,500; Stewart McPhie, brick stores and apartment houses on York and Merrick streets, for Herbert Holden, $11,000; Canadian Westinghouse Co., brick extension to foundry building, 112x208 ft. long, $25,000; W. A. Petit, eight brick dwellings on Fullerton avenue, $10,000; H. McCulloch, brick dwelling on Mount Royal avenue, $3,500.

London, Ont.

Among the permits issued recently are: McClary Manufacturing Company, warehouse on Adelaide street, $6,000; W. and T. Copp, seven brick houses on Yales street, $2,500 each; Hon. Adam Beck, addition to factory on Albert st., $2,000; Ed. Harrison, two storey brick, corner Simcoe and William streets, $2,500; Scandrett Bros., alterations to 175½ Dundas street, $3,500; sun room at Victoria Hospital, $650; Harry Lewis, alterations to 653 Queen's avenue, $850.

Hamilton, Ont.

MacNutt, Man.

Tenders will be received until May 1st by the postmaster for moving the town of MacNutt across the railroad track from its present site. About 15 buildings, some stables and outbuildings compose the lot, to be moved during the month of May.

New Westminster, B.C.

Recent building permits include: B. C. Electric Railway Company, $80,000; Bank of Commerce, Columbia street, $60,000; Y. M. C. A. building, $57,000; Kelly, Douglas & Co., Tenth street, $40,000; Cliff's building, Sixth street, $32,000; J. B. Wilson's dwelling house, Sixth avenue, $25,000; Hon. Mrs. Coutts, Marjoribanks buildings, Begbie street, $19,000; H. A. Eastman, Third avenue, dwelling house, $12,000; D. J. Stewart, Fourth avenue, residence, $6,000; G. R. Specks, Third avenue, $4,500; A. L. Lavery, Agnes street, $3,000; fire hall, $2,500; K. J. Macleod, Third avenue, $2,225.

Ottawa, Ont.

Tenders addressed to A. Johnston, deputy minister of marine and fisheries, will be received until May 1st for construction of two twin-screw gasoline launches for the Fisheries, Patrol service on the Great Lakes.

The Dominion Public Works Department has awarded the following contracts: Iron work for three 260-cubic yard dump scows for Vancouver, B.C., to Wallace Shipyard, Limited, of Vancouver, for $11,400; Regina, elevator for post office to Otis Fensom Elevator Co., for $46,380; Richibucto, N.B., wharf extension, approach and dredging, to Thos. O. Murray, of Richbucto, for $17,000; Ottawa, plaza between Sappers and Dufferin bridges, to John O'Toole and William H. McGillivray, for $236,000; Battleford, Sask., heating apparatus for public building, to Municipal Light, Heat and Power Company, of Brandon, Man., for $2,422; St. John, N.B., repairs to buckets of dredge to W. S. Fielding, to St. John Iron Works and Estate of James Fleming, of St. John, for $7,497.50 each; Chateauguay, Quebec, wharf, to Eugene Patenaude, of Montreal, for $7,243.84; Richibucto, Que., north breakwater extension, to T. P. Charleson, of Ottawa, for $20,995.

Renfrew, Ont.

The Renfrew Separate School Board will accept none of the tenders received for construction of new Separate School, all being too high. Plans will be altered and another call made for tenders.

Saskatoon, Sask.

Tenders addressed to Wm. P. Bate, Box 1046, Secretary, School Board, will be received until April 25th for erection, exclusive of plumbing, heating and ventilation of a school building. David Webster, architect, Kempthorne Block.

Toronto, Ont.

Tenders are called by Public Works Department, Ottawa, for dredging until April 24th. R. S. Desrochers, secretary. Advertisement in "Tenders and For Sale Department" of this issue.

Tenders addressed to G. R. Geary, mayor, will be received until April 25th for supply of lumber on account of the property and street cleaning department for the period commencing June 1st, 1911, and ending May 31st, 1912. Specifications, etc., at office of the above.

Vancouver, B.C.

The following building permits have been issued: Beard Home Building Co., frame dwelling, 1906 Eleventh west, $4,500; T. Edwards, frame store, Pender and Heatley, $13,000; Gionani Camicea, frame dwelling, 2756 Third west, $2,400; Jas. McMurray, farme dwelling, 1076 Eleventh east, $3,500; Ritchie Contractors' Supply Co., Granville street bridge, store, $4,000; R. A. McKenzie, frame dwelling, 2434 Sixth west, $3,600; G. L. Wright, frame dwellings (two), 3356-3362 Second west, $2,800 each; Mrs. A. B. Waldie, frame dwelling, 1715 Twelfth west, $3,500; Oliver & Wilson, frame dwellings (two), First west, $3,500 each; John Wakefield, frame dwelling, 550 Broadway, $6,000; C. A. Lett & Sons, apartment and stores, 2106 Hastings east, $10,000; W. Macfarland, alteration, 1865 Haro street, $6,000; Clarke & Sutherland, 801 Thirteenth avenue east, $2,500; John Morley, 2631 Seventh avenue west, two houses, $5,000; A. Nicholson, 1933 Seventh avenue west, $2,500; A. Neville Smith, 2335 Sixth avenue west, $4,000; G. E. Glass, 2176 Thirteenth avenue west, $3,000; W. C. Hodgson, 1715 Eleventh avenue west, $5,600; Vancouver Breweries, 2210 Scotia street, $3,000; G. A. Stinson, 1265 Twelfth avenue west, $4,000; N. D. McLaren, 1966 Bismarck street, $2,000; Mr. H. J. Duncan, six-storey block, 123 Pender street, $70,000; Storey & Campbell, 7-storey warehouse, Beatty street, on the C. P. R tracks, $60,000; R. G. Long, 1204 Fourteenth avenue east, two houses, $4,600; J. A. Jackson, 1686 Eleventh avenue west, $3,000; Frank Harris, 2150 Lakewood drive, $4,000; Royal Investment Company, 1629 Second avenue east, $2,700; A. Balderstone, 1589 Sixth avenue west, $3,000; J. D. Williams, 2037 Third avenue east, $2,500; J. Darby, 2385 Fifth avenue west, $3,500; R. J. Hopper, 1125 Fourteenth avenue west, $4,500;A. Harrison, 1750 William street, $3,800; Messrs. Maskill and Lee for a five-storey business block at 1161 Granville street, $60,000; Bentley & Wear, 3236 Second avenue and 2532 Eighth avenue west, four houses, $14,500; H. N. Odlin, 1610 Park drive, $5,500; J. Woodrow, 1705 Twelfth avenue west, $5,000; Park Board, pavilion in Stanley Park, $14,000; A. H. Morris, 848 Eleventh avenue east, $2,500.

Victoria, B.C.

Recent building permits include: Messrs. F. & J. Filer, one storey store building, Hillside avenue, $4,000; Mr. John Avery, dwelling on Cook street, $2,700; Mr. Lee Hue, dwelling on Skinner street, $2,450; Mrs. Margaret Stout, dwelling on Rendell street, $2,500; E. D. Grierson, Pemberton road, $12,000, contract has been awarded to A. H. Mitchell.

Winnipeg, Man.

A modern private hospital, three storeys in height, solid brick and reinforced concrete, fireproof throughout, will be built immediately by Dr. Thomas Beath at the corner of River avenue and Rose street, Fort Rouge. The new building will accommodate 60 patients and is thoroughly modern in every detail. He estimates the cost at $37,000. The building will probably be done by day labor under the supervision of the architect.

Recen building permits include: T. Olsen, dwelling, Home street, $2,600; A. Black, dwelling, McMillan avenue, $4,000; James McDonald, dwelling, Agnes street, $4,000; V. C. Brown, brick dwelling, Kingsway, $18,000; W. T. Carson, 3 dwellings, Gosvenor avenue, $15,000; W. H. Alexander, store extension, 395 Portage avenue, $3,000; W. McIntosh, two dwellings, Home street, $10,000;r Cameron, Stewart & Co., 10 dwellings, Home street, $50,000; Bandeen & Fraser, dwelling, Home street, $5,000; E. Watkins, dwelling, Jubilee avenue, $2,500; Y. M. C. A., branch institute, Selkirk avenue, $84,000; M. Chess, dwelling, Charles street, $5,000; C. Rogers, dwelling, Polson avenue, $2,500; L. Emma, store, Portage avenue, $4,600; Grose & Walker, three-storey addition to warehouse, Stanley street, $14,000; A. C. Galbraith, four dwellings, Basswood place, $10,000; McCrea & MacKenzie, three dwellings, Greenwood Place, $15,000; B. J. Hawker, dwelling, Beresford avenue, $3,800; J. C. Campbell, dwelling, Home street, $6,400; R. E. Minaker, store, Sargent avenue, $5,000; R. J. Whitla, addition to warehouse, McDermot avenue, 50,000; J. F. Parker, dwelling, Arlington street, $4,000; Mrs. A. Miller, dwelling, Evanson, $3,000; Ed. Noe, four dwellings, Jessie avenue, $12,000; H. Haldorson, dwelling, Aubrey street, $4,000; H. Haldorson, dwelling Simcoe street, $2,700; A. J. Hedges, dwelling, Burnell street, $3,000; S. Abramovich, eight dwellings, Rosseer avenue, $16,000; H. Genser, two dwellings, Lansdowne avenue, $6,800; W. E. Toshack, dwelling, Polson avenue, $2,500; A. E. Hyde, dwelling, Polson avenue, $2,500; W. Black, dwelling, Cobourg avenue, $2,000; James Lind, dwelling, Burnell street, $3,500; M. Avren, two dwellings, Lansdowne avenue, $4,000; M. Dorfman, two dwellings, Aikins street, $4,000.

New Companies

J. Watterson & Company, Limited, Montreal, Que., capital, $150,000, incorporated to manufacture and deal in iron, tseel, metals, bricks, cement, vitrified wares and clay, etc. Incorporators: J. Watterson, merchant, Westmount; E. B. Busteed, K.C., Montreal.

The Fort Frances Pulp and Paper Co., Ltd., Toronto, Ont., incorporated, capital, $50,000. Incorporators, W. Bain, bookkeeper, R. Gowans, H. Chambers, R. Musgrave Coates, all of Toronto.

Modern Gas, Light & Power, Limited, Montreal, incorporated, capital, $250,000. Incorporators, P. G. Majeau, insurance broker, J. A. Chagnon, accountant; P. Durocher, advocate, Montreal. Phoenix Lumber Company, Limited, Winnipeg, Man., incorporated, capital, $500,000.

The Palace Building Company, Limited, Montreal, incorporated, capital, $100,000. Incorporators, H. L. O'Donoughue, merchant, Hudson, Que.; C. A. Pariseault, and Omer Lapierre, advocates, A. Brassard, architect, all of Montreal.

Business Notes

The Canadian Iron & Metal Co., Montreal, are stated to have dissolved.

Edward Partington Pulp & Paper Co., Ltd., has increased capital by $200,000.

Lamoureux & Calestague, painters, Montreal, are stated to have dissolved.

H. Brunet & Cie, bricklayer contractors, Montreal, are stated to have registered.

Larose & Cie., Montreal, sash and door manufacturers, are stated to have dissolved.

Modern Stone Co., Ltd., Winnipeg, Man., has been succeeded, it is stated, by Manitoba Quarries, Ltd.

Williams Quarry Co., Ltd., Williams, Man., has been succeeded, it is stated, by Manitoba Quarries, Ltd.

The contract for the decorations for fourteen rooms and corridors in the Chateau Laurier have been awarded to Bell's galleries, of Montreal, and seven to Tiffany's studios of New York.

The refrigerator contract for the Chateau Laurier, being built by the Grand Trunk at Ottawa, has been awarded, the successful tenderer being the White Enamel Refrigerating Co., who manufacture the famous Bohn Syphon System. The silver contract has been awarded to the Martin Hall & Co., Shrewsbury Works, England.

The B. C. Gazette gives notice of the following companies: The Peavine Lumber Mills, Limited, capital, $50,000; the Dominion Western Timber Company, Limited, capital, $600,000; the North Pacific Power Company, Limited, capital, $50,000; Dominion Construction Company, Limited, capital, $30,000; the W. A. Corder Engineering and Supply Company, Limited, capital, $50,000; Contractors Material Company, Limited, capital, $50,000; R. A. McCullough Contracting Company, Ltd., capital, $10,000

Contracts for 1,000 miles of wire fencing in Saskatchewan and Alberta were given out by Canadian Pacific Railway Company, and two Winnipeg firms will do the work. The contract calls for maintenance fencing of the main line and branches in the two prairie provinces. This means the repairing, and in many places the replacing of the fences already existing. The [illegible] Wire Fence Company [illegible] [illegible] [illegible] 270 miles in Alberta

Tenders and For Sale Department

Tenders for School Building

Tenders will be received by the undersigned, up to **Monday, the 1st day of May next (1911)**, at 5 o'clock p.m., for building a school house of brick with cement trimmings, on Hickman street, West Highlands, Town of Amherst, according to plans and specifications which may be seen at Town Office, Amherst, and at the office of Leslie R. Fairn, architect, Aylesford, N.S., on and after **Monday, April 17th, instant.** Contractor to do all work and supply all material.

Tenders to be sealed and marked " Tenders for School Building" and must be accompanied with a certified cheque for $500 payable to the Town of Amherst, which amount will be forfeited to the said Town should the party whose tender is accepted neglect or refuse to execute a satisfactory contract to complete the work.

The Town Council do not bind themselves to accept the lowest or any tender.

By order of Town Council
W. FRED DONKIN,
Town Clerk.
Amhert, N.S., April 8, 1911. 15-17

TENDERS
FOR
COUNTY HOUSE OF REFUGE

Sealed tenders will be received by the undersigned, up to noon of **Tuesday, May 2nd, 1911**, for the erection of a County House of Industry and Refuge at Cornwall.

Plans and Specifications can be inspected at my office in County Building here, at the store of Mr. J. A. C. Hout, Alexandria, at residence of Mr. C. E. Cameron, Iroquois, or at the office of Mr. A. L. Weeks, architect, Ottawa.

Marked cheque for 5 per cent. of tender, payable to my order, to accompany tender. Cheques will be immediately returned to unsuccessful tenderers after contract awarded.

Dated at Cornwall this 8th day of April, 1911.

ADRIAN I. MACDONELL,
[illegible] County Clerk.

CITY OF BRANDON

Street Paving

Sealed tenders marked "Tenders for **Paving,**" will be received by the City Clerk, Brandon, Manitoba, until 12 o'clock at noon on **Friday,** the 28th day of **April next,** for paving the following streets in the City of Brandon:

Rosser avenue, Twelfth street to Sirth street.
Pacific avenue, Eleventh st. to Eighth st.
Princess avenue, Tenth street to Eighth st.
Eleventh street, Rosser ave. to Pacific ave.
Tenth street, Princess ave. to Pacific ave.
Ninth street, Princess ave. to Pacific ave.
Eighth street, Princess ave. to Pacific ave.

Tenders are invited for Wood Block, Asphalt Block, Sheet Asphalt, Granitoid, Bitulithic and Vitrified Brick, on 5-inch and 6-inch concrete foundations, or other kinds of pavements.

Proprietors of patented pavements are requested to furnish their special specifications.

An accepted bank cheque for 5 per cent. of amount of tender must accompany each bid.

The lowest or any tender not necessarily accepted.

Further particulars can be obtained from City Engineer's Office.

R. E. SPEAKMAN,
City Engineer's Office, City Engineer.
Brandon, March 31, 1911. **14-16**

Steam Shovels

We own and have for sale near Buffalo, N.Y., two Vulcan 75-ton 2½-yard steam shovels; late model, with new extra large boilers and in excellent condition; also one 70-ton. These will stand most rigid inspection and we are offering them at unusually low prices. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Sallé Street,
T.F. Chicago, Ill.

CITY OF REGINA
Saskatchewan, Canada

Tenders for Sewage Pumps and Motor. Switchboard and Apparatus. For Sewage Disposal Works.

Sealed tenders marked "Tenders for Sewage Pumps, Disposal Works," will be received by the City Commissioners, Regina, until 12 o'clock noon, **April 30th, 1911,** for the supply of One 1,000,000 gallons per 24 hours capacity Pump and Motor. Switchboard and Apparatus.

Full particulars may be had upon application to the Chief Engineer, Trunk Sewer Works.

The lowest or any tender not necessarily accepted.

(Signed) JOHN MARSHALL,
Chief Engineer,
Trunk Sewer Works.
April 6th, 1911. 15-17

Tenders for Dredging

Sealed tenders addressed to the undersigned and endorsed "Tender for Dredging, Toronto, Ontario," will be received until **Monday, April 24th, 1911, at 4 p.m.,** for the work mentioned.

Tenders will not be considered unless made on the forms supplied, and signed with the actual signatures of tenderers.

Combined specification and form of tender can be obtained on application to the Secretary, Department of Public Works, Ottawa. Tenders must include the towing of the plant to and from the work. Only dredges can ye employed which are registereed in Canada at the time of the filing of tenders. Contractors must be ready to begin work within thirty days after the date they have been notified of the acceptance of their tender.

A cheque equal to five per cent. (5 per cent.) of the amount of the tender and based on the approximate quantities, must accompany the tender. The cheque must be accepted, on a chartered bank, and payable to the order of the Honourable the Minister of Public Works. If the tender be not accepted the cheque will be returned.

The Department does not bind itself to accept the lowest or any tender.

By order,
(Signed) R. C. DESROCHERS,
Secretary.

Department of Public Works,

Ottawa, April 10th, 1911.

Newspapers will not be paid for this advertiement if they inert it without authority from the Department. 16-16

PAVING

City of Fort William, Ont.

Sealed and endorsed tenders, addressed to the Chairman of the Works Committee, will be received at the office of the City Clerk before 5 o'clock p.m., of **May 4th, 1911,** for the paving with asphalt block, sheet asphalt or bitulithic of—

May street, 46 ft., curb to curb., approximately 5,700 square yards.

Brodie street, 46 ft., curb to curb., approximately 8,400 square yards.

Plans, Specifications and Forms of Tender may be obtained at the office of the City Engineer.

Each tender must be accompanied by a marked cheque for **$1,000.**

The lowest or any tender not necessarily accepted.

JOHN WILSON,
City Engineer's Office, City Engineer.
Fort William, April 1, 1911. 14-16

Department of Railways and Canals, Canada

Ontario—St. Lawrence Canals

Farran's Point Canal

Sealed tenders addressed to the undersigned and endorsed "Tender for Improving Lower Entrance" will be received at this office until 16 o'clock on **Friday, April 21.**

Plans, specifiactions and form of contract to be entered into can be seen on and after April 3, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wage schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $9,000 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES, Secretary.

Department of Railways and Canals,
Ottawa, March 30, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. **15-16**

TENDERS
For Waterworks Supplies

The Board of Water Commissioners for the City of London, are inviting tenders for Water Works Supplies for the current year. The list includes Brasswork, Lead Pipe, Iron Pipe, Iron Castings, Stop Cock Boxes, Street Hydrants, Valves, and Valve Chambers.

Tenders will be received up till 12 o'clock noon on **Thursday, April 27th, 1911.**

For information address,

H. J. GLAUBITZ,
General Superintendent.
16-17 London, Ont.

City of Edmonton, Alberta

Sealed tenders marked "Tenders for Trunk Sewer," will be received by the City Commissioners up till 3 p.m., **May 2nd, 1911,** for the supplying of all materials and the construction, in tunnel of a concrete sewer ten feet six inches (10 ft. 6 in.), in internal diameter and approximately 3,290 feet long.

Plans and specifications and all particulars may be obtained from the City Engineer's office, Edmonton, on deposit of a marked cheque for the sum of $25.00, which will be held until the return of plans and specifications. Duplicates of which may be seen at the office of the Contract Record, B34 Board of Trade Building, Montreal, Que.

Lowest or any tender not necessarily accepted.

CITY COMMISSIONERS.
A. J. LATORNELL,
City Engineer,
Edmonton, Alta. 14-16

CITY OF MOOSE JAW
Saskatchewan
Tenders

Sealed tenders will be received by the undersigned City Clerk up to 8.30 p.m. on **Monday, April 24th, 1911,** for the supply of approximately 400 White Cedar Poles, for use in the Electric Light Department.

Specifications and full particulars may be obtained on application to the undersigned or to J. D. Peters, Electrical Superintendent, Moose Jaw.

Tenders to be at a price f.o.b. Moose Jaw and to be endorsed "Tenders for Electric Light Poles."

The lowest or any tender not necessarily accepted.

W. F. HEAL,
15-16 City Clerk

Tenders for Sewers

Sealed tenders addressed to the undersigned will be received up to 4 p.m., **Friday, April 28, 1911,** for the construction complete and supplying of all material necessary of approximately 3,200 lineal feet of Sewers in the Town of Perth. Approximately 3,200 lineal feet of 8-inch pipe and 75 feet of 6-inch pipe. Tenders to state price for excavation or backfilling per cubic yard of earth, hard pan and rock. The building complete of Catch Basins, Manholes, Lamp Holes and the laying of and supplying the necessary pipe or Ys.

Tenders must be accompanied by marked cheque for $400.

The lowest or any tender not necessarily accepted. The Corporation reserves the right to withhold from construction the work on any street whereon the residents decline to install water service.

JNO. A. KERR,
Town Clerk
or
JAS. J. HANDS,
Chairman Sewer Committee.

TENDERS for HEATING

Sealed tenders for steam heating of Victoria Hall, in Cobourg, Ont., addressed to the County Clerk, Cobourg, will be received up to noon on **Thursday, June 1st next,** marked "Tenders for Heating." Plans and specifications can be seen at the office of the County Clerk, Cobourg.

GEORGE GREER,
Chairman of Committee
Cobourg, April 13, 1911. 16-16

Toronto Main Drainage

Low Level Interceptor:

Section No. 5—3,350 linear feet.
Section No. 6—2,830 linear feet.
Section No. 7—3,778 linear feet.
Section No. 8—3,238 linear feet.

Sealed tenders for the laying of reinforced concrete pipe sewer complete will be received by registered post only, addressed to the Chairman of the Board of Control, Toronto, Ontario, up to noon of **May 9th, 1911.** The concrete pipe to be laid will be supplied by the City. The diameters are as follows: For Section No. 5, 60 inches; for Section Nos. 6, 7 and 8, 66 inches.

Plans and specifications will be on file at the office of the CONTRACT RECORD, B-34 Board of Trade Building, Montreal, after Monday, April 18. Plans may be seen, and specifications and further information obtained from the Main Drainage Works, City Engineer's Office, Toronto.

G. R. GEARY, Mayor,
15-16 Chairman, Board of Control.

Notice to Contractors
West End Drainage System

Sealed tenders addressed to the Chairman of the Board of Control, endorsed "Tender for West End Drainage System," will be received at the City Hall, Ottawa, up to 4 p.m., **Thurday, April 27th, 1911,** for the construction of the West End Drainage System.

Any tender received after the above stated time will be declared informal.

Specification, plans, profiles, forms of tender and full particulars may be seen on application at the City Engineer's Office, City Hall.

The Corporation does not bind itself to accept the lowest or any tender.

NEWTON J. KER,
City Engineer.
Ottawa, April 11, 1911. 16-16

City of Fort William.
Paving

Sealed and endorsed tenders, addressed to Chairman of the Works Committee, will be received at the City Clerk's Office before 5 o'clock p.m. of **Thursday, the 4th day of May, 1911,** for paving with asphalt block, sheet asphalt, or bitulithic, of:

May street, 46 ft., curb to curb, approximately 5,700 square yards.

Brodie street, 46 ft., curb to curb, approximately 8,400 square yards.

Plans, specifications and forms of tender may be obtained at the office of the City Engineer.

Each tender must be accompanied by a marked cheque for One Thousand Dollars.

The lowest or any tender not necessarily accepted.

JOHN WILSON,
City Engineer.
April 8, 1911 16-16

Notice to Architects

The Sudbury Rink Company, Limited, requires plans for a skating rink, to be fireproof, steel and concrete, or brick; size of arena 70 feet by 170 feet; waiting rooms along one side 20 feet by 170 feet; bank of seats over waiting rooms. Cost not to exceed $16,000. Plans must be submitted by May 1st, 1911. Accepted plan only will be paid for, and architect engaged. 16-16

Corporation of the Town of Collingwood

Tenders will be received by the undersigned until 2 o'clock p.m., **May 3rd, 1911,** for the following:

Approximately 3,765 square yards of Bituminous Pavement on a five-inch concrete foundation.

Approyimately 9,504 lin. feet of concrete curb.

Approximately 9,504 lin. feet of sixteen inch concrete gutter.

All tenders must be accompanied by an accepted cheque for the sum of Two hundred dollars made payable to the Town Treasurer, same to be forfeited to the Corporation if the party tendering declines entering into the contract for the work, at the rates stated in the offer submitted. All tenders must be sealed and sent by registered mail and marked "Tender for Bituminous Paving." For further information apply to the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

K. S. MACDONELL,
Town Engineer.
Collingwood, Ont.
April 12th, 1911. 16-17

Department of Railways and Canals, Canada

Ontario—St. Lawrence Canals
CORNWALL CANAL

Sealed tenders addressed to the undersigned and endorsed "Tender for Canal Office Enlargement" will be received at this office until 16 o'clock on **Friday, April 21.**

Plans, specifications and form of contract to be entered into can be seen on and after April 3, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence Canals, Cornwall, at which places form of tender may be obtained.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the [illegible] ber of the firm.

An accepted bank cheque for the sum of $500 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party [illegible]

[illegible]

The cheque of the successful tenderer will be [illegible]

[illegible]

By order,
L. K. JONES, Secretary.

[illegible]

paid for it. 15-16

CITY OF SASKATOON

Tenders Wanted for

Excavating and Pipelaying

[illegible] addressed to the City Com[illegible] will be received up to [illegible] Friday, April 28th, 1911, for [illegible] about ten and one half miles water mains and sewer mains in the City of Saskatoon, and furnishing certain materials therefor, according to specifications, plans and profiles dated March 1st, 1911.

Plans, Specifications, Instruction to Bidders, General Conditions, and Forms of Tender may be seen at the office of George T. Clark, City Engineer, Saskatoon. Instruction to Bidders, and Forms of Tender will be furnished on application but copies of Plans and Specifications will not be furnished.

The lowest or any tender not necessarily accepted.

[illegible],
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., April 13, 1911. 16-17

COUNTY OF OXFORD

Bridge Tenders

Sealed tenders addressed to the undersigned will be received up till noon of **Saturday, the 6th day of May**, for the erection of three steel bridges, one of 140 feet span and one of 55 feet span, and one of 50 feet span. Also for the construction of concrete abutments for the same.

Tenders will also be received at the same time for the construction of two or three concrete bridges of 10 feet or 12 feet span. Further particulars may be obtained from the undersigned. Plans and specifications may be seen at the County Engineer's Office or at the home of J. O. Given, Reeve of Blenheim Township, lot 12, con. 5.

The lowest or any tender not necessarily accepted.

F. J. URE,
County Engineer,
16-16 Woodstock, Ont.

Temiskaming and Northern Ontario Railway Commission

Sealed tender, addressed to the undersigned, will be received up to 12 o'clock noon, on **Wednesday, May 3rd**, for all works in connection with the construction of a passenger station at Matheson. Tenders to be marked on envelope "Passenger Station at Matheson."

Plans and specifications may be seen at the office of the Architect, J. M. Lyle, 14 Leader Lane, Toronto, or at the office of the Chief Engineer in North Bay.

Certified cheque on a chartered bank of Canada, payable to the order of the Secretary-Treasurer of the Commission, for 10 per cent. of the amount of the tender, must accompany same.

The lowest or any tender not necessarily accepted.

A. J. McGEE, Sec.-Treas.
25 Toronto Street, Toronto.
Toronto, April 12th, 1911.

Note—Papers inserting this advertisement without authority will not be paid for it. 16-17

Tenders Wanted

Sealed tenders will be received by William Purves, Clerk of East Whitby Township, Columbus, Ont., until Monday, May 1st, at 2 p.m., for the construction of a 35 foot concrete bridge near Oshawa.

For information apply to H. Gifford, Reeve, Cedardale.

BOWMAN & CONNOR,
Engineers,
16-16 36 Toronto Street, Toronto.

Positions Wanted

Advertisements under this heading one cent a word per insertion. Box No ten cents extra

POSITION WANTED—AS Foreman on railway, sewer, or other contract work, by man of wide experience. At liberty to accept favorable terms immediately. Address, Box 260, Cotract Record, Toronto, Ont. 15-17

Miscellaneous

Advertisements under this heading two cents per word per insertion.

CANADIAN AGENT WANTED—I would like to secure a good wide-awake Canadian representative to represent my line of "Perfect" Brick Tile and Block Machines, Silo Cistern Sill Post and Chimney Moulds, No. 2 and No. 3 Brick Moulds. I intend to have my machines manufactured in Canada at an early date. For full particulars write C. S. Wert, Kendallville, Ind. 15-16

WANTED—Engineer or Contractor to represent our systems of piling and wharf construction in St. John, N.B., and Fort William, Ont., either as agent or contracting licensee. None but firms or individuals in good standing need apply. A good opportunity for the right parties. Apply by letter to The Simplex Concrete Piling & Construction Company, Limited, 2 Manning Annex, Toronto, Ont. 16-16

TO DEALERS IN CANADA—Large American manufacturers of Waterproofing Portland Cement want to secure reliable representatives in Canada. We are offering a dealer's proposition whereby we agree to spend a certain number of dollars per ton for advertising in Canadian journals. Our product now enjoys a large and increasing sale throughout the United States. For particulars write to E. J. MacIntyre, 4059 Perry Street, Chicago, Ill. 15-16

Business Notes

Canada Lime Co., Montreal, Que., are stated to have dissolved.

Gilbert Julien, plumber, Ottawa, has been succeeded by E. Glaude.

Gaudette & Frere, contractors, Montreal, have registered.

O. Hogue & Cie, plumbers and roofers, have registered.

W. J. Leach, builder, Toronto, is stated to have assigned.

McGregor & Black, contractors, Regina, Sask., are stated to have dissolved.

Arnold Electric Co. of Canada, Montreal, Que., are reported to have dissolved.

Robert & Robert, builders' supplies, Montreal, are reported to have dissolved.

International Supply Co., Montreal, builders' supplies, are stated to have assigned.

Olivier Dubois, carrange makers, supplies and lumber, Montreal, have registered.

Heon, Roy & McLeod, contractors, Three Rivers, Que., are stated to have dissolved.

I. Tremblay & Co., plasterer contractors, Montreal—Mrs. Isidore Tremblay, has registered.

Drake & Drake, builders and contractors, Hamilton, are reported to have dissolved.

J. H. Vickerson Electric Company, Montreal, Que., are stated to have dissolved.

Home Electric Company, Kenora, Ont., has been succeeded by W. J. McLaughlin.

Laurie & Lamb, consulting and contracting engineers, Montreal, Albert Laurie, registered.

Raith Agencies, Limited, builders' supplies, Montreal, has been granted a winding-up order.

Hull Woodenware Company, Limited, manufacturers toothpicks, are stated to be in voluntary liquidation.

L. P. Jodoin & Co., cement contractors, St. John, Que., Mrs. Louis Phillippee Jodoin, have registered.

Jos. Brunet & Fils, bricklayer contractors, Montreal, Jos. Brunet and Ernest Brunet, have registered.

Berrington, Son & Watney, civil engineers, of Wolverhampton, England, intend opening a branch office in Calgary.

Pratt Specialty Co., hardware and electrical supplies, Montreal, Geo. F. Pratt and M. J. McLaughlin, have registered.

Bastien & Dagenais, sash and door manutacturers, Montreal, Josephat Bastien & Francois Xavier Dagenais, have registered.

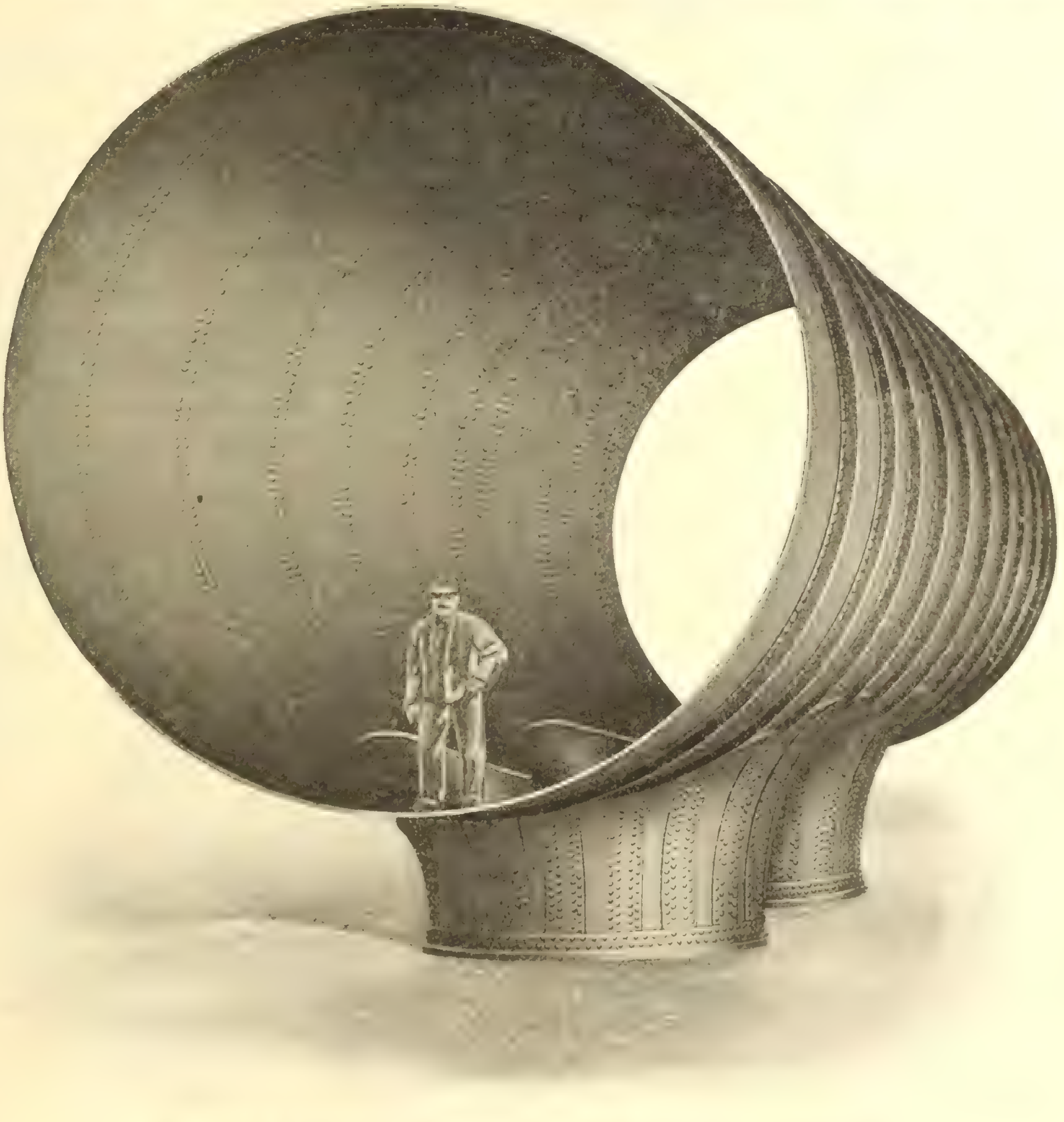
Canada Ford Co. and The Ford Iron Co., Montreal, Que., E. Herman Ford, K. E. Drinkwater, C. A. Stuart, and H. R. Hingston, have registered.

Geo. Anderson & Co., engineers and ironfounders, of Carnoustie, Scotland, and Montreal, have opened a branch at 504 Builders' Exchange, Winnipeg, for the purpose of looking after their western trade.

The Canadian Pacific Railway has ordered 750 steel underframe flat cars from the Canada Car and Foundry Co. The cars are of regular standard design with the exception that for the intermediate floor stringer a 3-inch rolled steel Z bar is used to which the floor is bolted at intervals. In previous cars this bar was generally of wood, to which the floor was nailed.

The contract of Messrs. Vickers' Sons & Maxim with the Canadian government and the Harbor Commissioners of Montreal provides for the construction and operation of a floating drydock with a lifting capacity of 27,000 tons; the establishment of a ship-repairing plant and a mill for the production of steel railway ties in respect of which they receive from the Canadian government subsidy of three per cent., interest on $3,000,000 for a period of thirty-five years. This is a first-class subsidy, under the graving dock subsidies act passed by the Dominion Parliament. The contract stipulates that the dock is to be placed in a basin at the mouth of Molson's Creek, at the east end of the harbor, and the site of the proposed works will be a piece of land thirty-six acres in extent to be reclaimed from the river shore by the Harbor Commissioners. The floating dock is to be completed and installed by May, 1912, by which time the basin will be ready for its reception.

PENSTOCKS



Side view of Penstock Distributor built for the Ontario Power Co.

We would be glad to hear from those who have Heavy Plate work of any kind to build and especially American Companies who are contemplating the erection of Penstocks or Heavy Plate work of any description in Canada. We are specially equipped for this work.

Write us for particulars

The John Inglis Company Limited

Engineers and Boilermakers

14 Strachan Ave. TORONTO, Canada

Advance Information

MacLean Daily Reports

MACLEAN DAILY REPORTS give authoritative advance information on all BUILDING AND ENGINEERING PROJECTS contemplated or in course of construction in Canada.

This information is obtained by our own staff of reporters and correspondents, each of whom is assigned a definite territory. Reports are issued daily—each on a separate slip.

Our service enables you to get in direct touch with each prospect at the earliest possible moment—long before the other fellow. MACLEAN REPORTS give advance information of all possible buyers—the material and equipment wanted. They enable you to follow up all sales possibilities—persistently and aggressively.

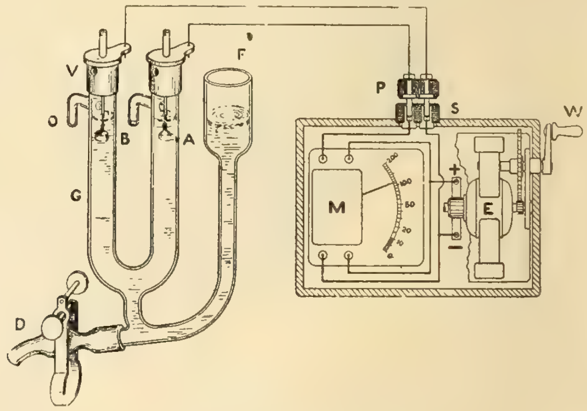
MACLEAN REPORTS will benefit your business. May we tell you how?

220 King Street West

Toronto - Ontario

Electric Water Tester

The detection and estimation of impurities dissolved in water has hitherto been carried out by chemical tests of more or less complexity and water testing suggests at once a skilled chemist and all the paraphernalia of a chemical laboratory. A new apparatus known as the Dionic Water Tester substitutes a simple electrical measurement of conductivity for the chemical reactions hitherto used for the purpose. The working principle of the apparatus is based upon the fact established by Kohlrausch that the conductivity of pure water containing any electrolytic substance in solution is due almost entirely to the dissolved substance and only to a negligible extent to the water itself. Kohlrausch established the law that, provided a solution is very dilute, the conductivity is proportional to the percentage amount of the substance dissolved in the water. The Dionic Tester is able, by measuring conductivity, to measure with accuracy the percentage amount of any electrolytic substance dissolved in water. It does not discriminate between one kind of substance and another; analysis alone can do that. But in most instances in which water testing is carried out for engineering and kindred purposes, the substance present in the water is well known, having been ascertained once for all by analysis, or being inherent in the source of supply. Such tests are not made for purposes of analysis, but to find out how much of a known substance is present in the water.



Dionic Water Tester

The complete apparatus is shown in the figure where G is a bent glass tube to contain the water under test, and A and B are the electrodes for passing the electric current through the water. The electrodes are connected by wires to a direct-reading conductivity meter M, and a continuous-current hand-driven dynamo E, so that by turning the handle W of the dynamo, a current traverses the meter and the water in the conductivity tube G. The pointer of the meter is deflected, and comes to rest at some point upon the scale which directly indicates the conductivity of the water in the tube. The test is completed as soon as the pointer has come to rest, that is to say, in two or three seconds. For further particulars address the selling agents, Messrs. Vandeleur & Nichols, Dineen Building, Toronto.

The Edmonton Builders' Exchange is taking a firm stand, and for all the unions (excepting the bricklayers and laborers—which have agreements extending until 1913) there will be nothing but open shop after May 1st. The agreement with the carpenters' union which has still two years to run, will be cancelled on the ground that it has been found unworkable, and further, that it has been violated. In spite of the builders' attitude, however, no serious trouble is anticipated.

Fred Holmes, President C. P. Holmes, Sec'y-Treas.

Telephone North 663

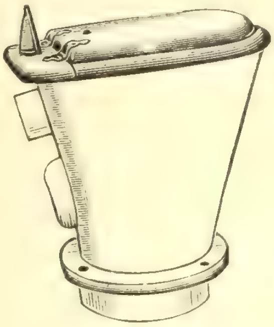
Fred Holmes & Sons

Limited

Building Contractors

1113 Yonge St., Toronto

Architects, Contractors, School Trustees



do you want your schools hotels, factories or public buildings up-to-date? If so, use

"RED CROSS" CLOSETS

Made especially to fill the requirements where no sewerage is available. Catalogue D upon application, with full particulars.

Red Cross Sanitary Appliance Co.
Grimsby, Ontario

PURE WATER

It is easy to obtain with our plants and apparatus

We design and contract for complete municipal filtration plants of any capacity.

We supply and install apparatus for sterilizing water supplies by the application of calcium hypochlorite.

Literature, Sketches, Estimates and Recommendations Supplied on Request

American Water Softener Co.
1001 Chestnut St., PHILADELPHIA, Pa.

We have no affiliations or working acquirements with any of our competitors.

For efficient and economical

Weather and Waterproofing

use

Kiton

The Coal Tar which is soluble in water (but once only)!

It can be applied everywhere, to anything, even to

Wet and Cold Walls

No Tar Kettle! No Fire! No Waste!

For information write to

F. P. Mansbendel
General Distributor for Canada
212 Huron St., - Toronto, Ont.

Terra-Cotta Fireproofing

Get an Estimate from

ROBERT BENNETT
Contractor
347½ Euclid Avenue, Toronto

☞ Over 25 years experience in U. S. and Canada

PHONE COLLEGE 4362

Dundas Stone

All Sizes For Concrete, Road Work and Sidewalks.

Flux Stone

Doolittle & Wilcox, Limited
Dundas - Ontario

RAILWAY CONSTRUCTION PLANT

Hoisting Engines, Horse Powers, Hand Winches, Derricks, Car Wheels, Axles and Boxes, Dump Cars, Rail Cars, Buckets

MARSH & HENTHORN, Limited

Makers of Hoisting Machinery, BELLEVILLE, ONT.

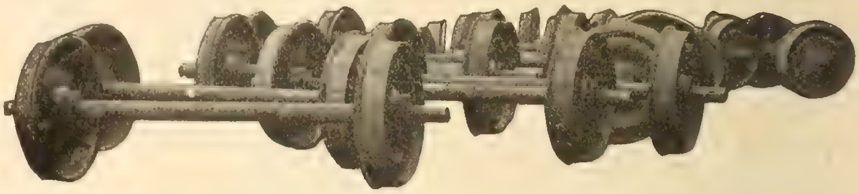
Send for Catalogue

SALES AGENTS

MUSSENS

LIMITED

Montreal, Que.



Do You Think

that you can Afford

to pass us by before getting our prices on your requirements or before putting in your tenders on

Plate Sheet Fancy

or any kind of

Glazing Glass

The

Consolidated Plate Glass Co.

of Canada, Limited

TORONTO MONTREAL WINNIPEG

- Special Mantles
- Stair Cases
- Panelling
- Veneered Doors
- Glass Partitions
- Bank Fittings
- Office Fittings
- House Fittings

—: OUR WESTERN AGENTS :—

E. V. Alburty,
Dominion Trust Bldg.
Vancouver, B.C.

J. Malcolm-Suttie,
Travellers Building,
Winnipeg, Man.

Saskatoon Forwarding & Storage Co.
Saskatoon,
Saskatchewan

Walker & Barnes
Edmonton,
Alberta

Lickley's Ltd.

Mail Building

Phone Main 3166 TORONTO

The Carey Roof Standard

CAREY'S FLEXIBLE CEMENT ROOFING

TO PROVE TO YOU the high, standardized construction and composition of Carey's Roofing, we want to send you BOOKLET AND SAMPLE FREE, and give you practical information regarding Carey's Roofing based on 25 years' actual time-proved tests Carey's Roofing is equally adapted to flat or steep surfaces, wood sheathing, tile or concrete. Whether your contract is large or small, we want to show you the advantage of using a standardized roofing material. THE PHILIP CAREY MFG. Co., 60 Wayne Ave. Cincinnati, O. 50 Branches.

"FAMOUS FOR DURABILITY"

ORNAMENTAL IRON WORK WIRE CLOTH AND WIRE GOODS

Perforated Metal
Concrete Reinforcement
In Rolls, Lengths or Sheets

WE SOLICIT YOUR ENQUIRIES

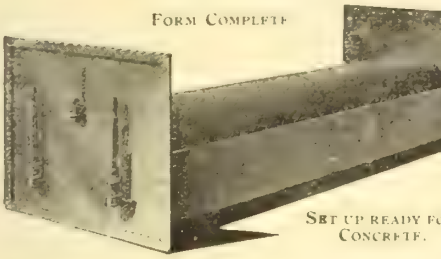
Canada Wire Goods Mfg. Co.

HAMILTON, ONT.

COLLAPSIBLE STEEL FORMS

For the Building of

Culverts, Conduits, Small Bridges, Sewers, Etc.



Our Collapsible Steel Forms are the lightest, strongest and most durable made. They combine in the simplest way every requirement for rapid and practical work, and are attracting wide attention. They are highly endorsed by road and street officials, contractors and engineers everywhere.

WRITE FOR FORM CATALOGUE
ENGINE CATALOGUE FOR THE ASKING
COMMISSIONER'S TIME BOOK FREE

Concrete Form & Engine Co.

Successor to Collapsible Steel Form Co.

83 Congress St., W., Detroit, Mich.

"The durability of a building is the gauge of its value from an economic standpoint."

—The Philosopher of Metal Town.

Absolute perfection in workmanship and quality of material used is the reason for the superiority of our

Corrugated Sheets

Only the best quality COLD ROLLED steel is used—a much tougher and finer material than the hot rolled article.

Each sheet is accurately squared and the corrugations PRESSED one at a time—not rolled—giving an exact fit without waste.

Specify our corrugated sheets and know that you are getting the best—the strongest and most durable on the market.

Flat or curved—galvanized or painted. Any size or gauge

Our special prices on car lots will interest you. Send for our new catalogue No. 70—it contains interesting information on Metallic Building Materials.

Manufacturers 195

The Metallic Roofing Co Limited

TORONTO & WINNIPEG

Neptune Meter Co.

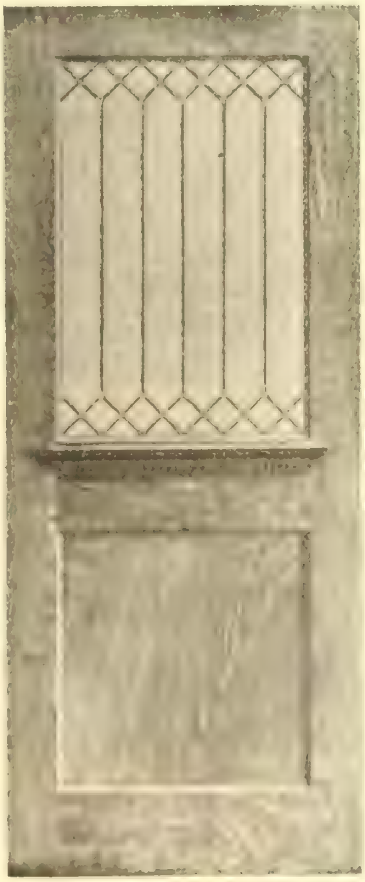
Manufacturers of the well-known

TRIDENT Frost-Proof Water Meters

Write for Catalogue

Main Office - 90 West Street

New York City



Interior Trim, Doors, Stairwork

We are manufacturers of a fine line of Pine and Hardwood finish including interior trim, interior hardwood, pine and veneered doors and stair work.

If you are in the market for any of the above send us your plans and specifications and let us quote.

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Manufacturing Co.

Limited

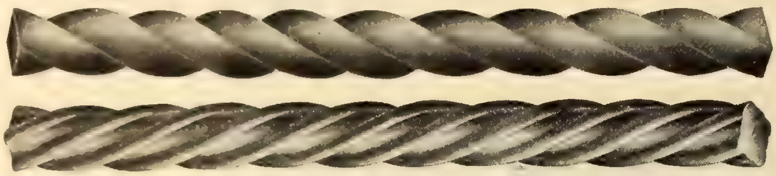
Collingwood, Ontario

Steel Bars for Reinforcing Concrete

Plain, Round, Square, Flat, Twisted and Spiral Bars. Channels for Fireproofing

Squares and
Rounds
3-8 in. to
1 1-4 in.

Elastic Limit
50,000 lbs.
or Higher



HIGH ELASTIC TWISTED BARS FOR REINFORCING CONCRETE

Immediate
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Cut to
Required
Lengths

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Toronto Office
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Producers of the Celebrated

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Bedford Stone

Bedford Indiana
Limestone

Mill Blocks
Sawed Planed and Turned Stone

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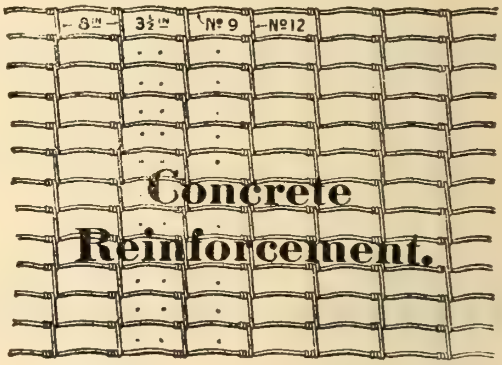
Concrete Reinforcement

• In 3½ ft. Rolled Units

Page Concrete Reinforcement with a 3½ x 8 mesh, and running wires of 2,200 lb. tensile strength is used on the Harbour Commission Elevator, Montreal, Soulanges Canal, etc. It replaced on the Chambly Dam reconstruction on the Richelieu, a reinforcing that failed, although of large reputaton. This is proof of its quality. It really reinforces concrete work under heavy stresses.



Put up in rolls for easy transportation. Running wires of high carbon steel, not bent or kinked, and of full strength. For adaptable and safe reinforcing of concrete, in dam, retaining wall, and bridge work, factory and foundation work, etc.

PARTICULARS, QUOTATIONS AND SAMPLE ON REQUEST.

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Walkerville, Ont.
Toronto **Montreal** **St. John**

THE H. & E. PATENT BALL-BEARING LIFTING JACKS

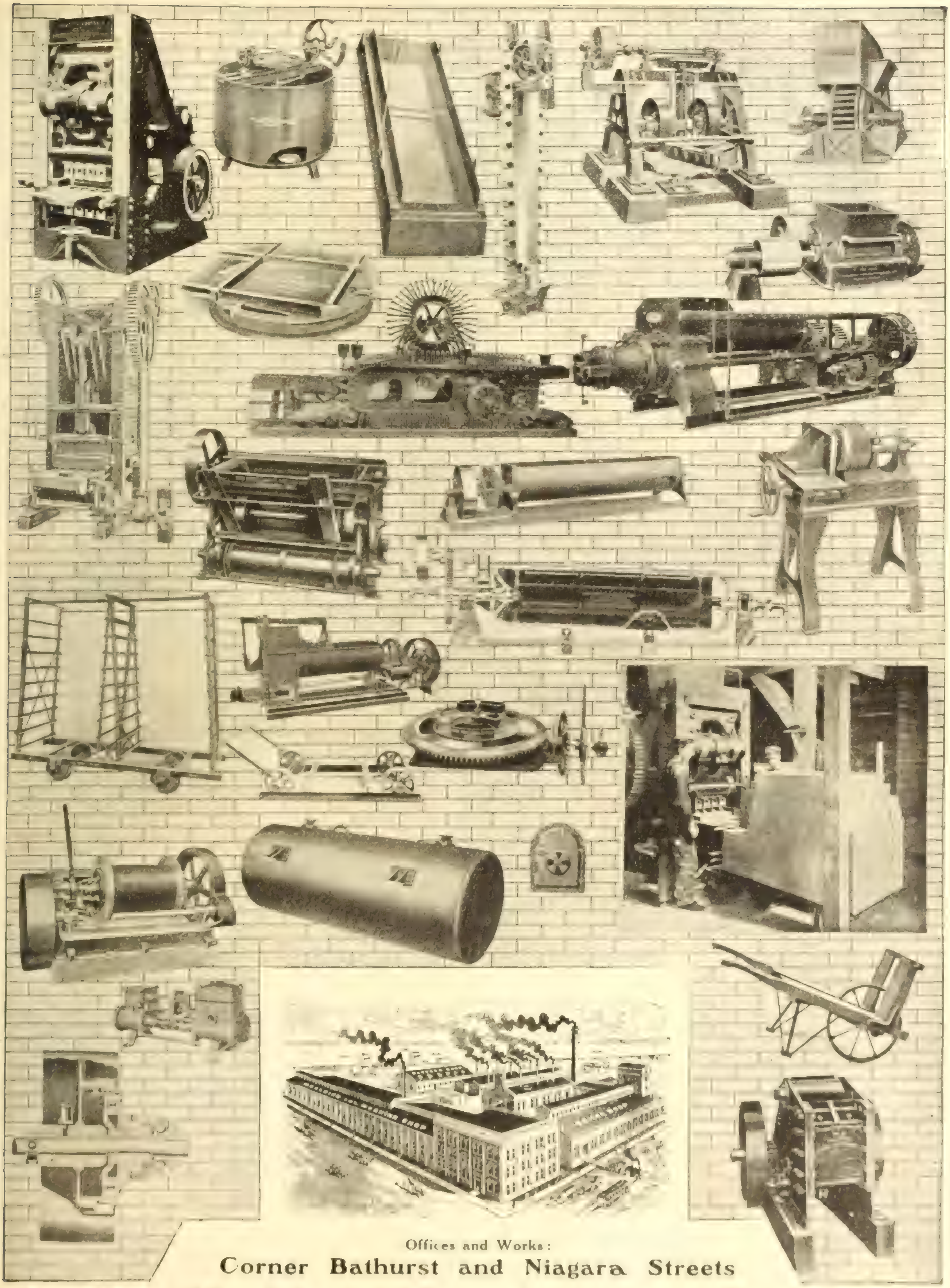
For Railway and Bridge Work, Contractors' and Builders' Use

Made by practical Jack Builders. Material: best grades of malleable iron and steel. Fully guaranteed as to durability and efficiency. The long even stroke of the lever, together with the design and careful construction of the jack, makes it the quickess and easiest working lifting appliance on the market. Made in plain and foot-lift styles. Adapted to all classes of work where a lifting jack can be used. Sizes from 8 to 50 tons capacity now complete. Send for prices and discounts.

To any responsible Firm or Railway in Canada any of these jacks will be sent on 30 days trial.

Manufactured by
H. & E. Lifting Jack Company
Waterville, Que.

Stock carried by F. H. Hopkins & Company, Montreal



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Corner Bathurst and Niagara Streets

The Berg Machinery Manufacturing Co., Limited

Toronto - Ontario

Note tremendous metal weight on this floor. Entire building of Alsen's Cement, reinforced concrete

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
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Sand & Supplies
LIMITED
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'Water-washed' & Gravel

Crushed Granite
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Birch, Mahogany, Plain Oak, Quartered Oak, Cypress, etc.
Sash, Doors, Porch Columns, Store Fronts, Mouldings, etc.

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Manufacturers of Fine Woodwork
Kingston, Ontario

"The best is cheapest"

"Sanorto"
Composition Flooring

Guaranteed durable, jointless, noiseless; fire, water, insect and dust proof
For Churches, Hospitals, Hotels and all public buildings it is unequalled. Its use in private houses for bath rooms, kitchens, verandahs, etc, has always given the greatest satisfaction.
Our imitation marble is perfect. Testimonials on application Estimates on all classes of work free. Distance no object. Write for samples

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EVERYTHING YOU WANT
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Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

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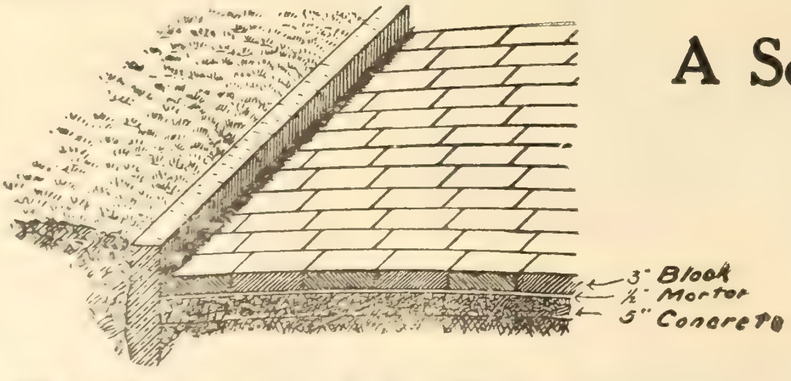

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must be
Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.

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Shop Prepared Reinforcing Materials—Eliminating Expensive Field Labor

The Cheapest Reinforcement—and Best

The superiority of the Kahn Trussed Bar has never been questioned, so that we can say "cheapest" and be understood. Increased facilities and improved machinery enable us to sell Kahn Trussed Bars at a price which literally compels you to buy them.

Forget every admitted advantage of the Kahn Trussed Bar—consider it strictly from a dollar-and-cents standpoint, and you will find that its use actually **saves you money.** IN SIMPLE PLAIN ENGLISH WE HAVE THE CHEAPEST BAR ON THE MARKET AND WE ARE READY TO PROVE IT.

Kahn Trussed Bars save steel, because the shear members are formed from the flanges of the main bar which are ordinarily wasted, and thus do away entirely with the expense of loose stirrups.

Kahn Trussed Bars save labor of installing many loose bars, because the shear members and main bars are handled as one piece.

Kahn Trussed Bars safeguard your structure, because the rigidly connected shear members make its strength independent of the adhesion of the concrete, which may be destroyed by fire, shock or careless workmanship.

Kahn Trussed Bars make beams 20 per cent. stronger than where loose stirrups are used, as proven by University Tests.

INSIST ON RIGID CONNECTION OF SHEAR MEMBERS

KAHN TRUSSED BARS

Use your own standard to measure us by; high quality, low price, prompt shipment, engineering service, long experience, extensive use, etc.; convince yourself of the absolute facts. Whether you use one hundred pounds or a thousand tons, you must be interested in our proposition. Whether you do your own designing or want the Kahn System engineers to do it for you, we are ready with the proofs.

Kahn System Products cover the complete field of concrete.

HY-RIB, a self-centering reinforcement for Floors, Walls, Roofs, Partitions, Ceilings.
RIB METAL, for Slabs and Conduits.
RIB BARS, Bent or Straight.
RIB LATH and **RIB STUDS,** for Plaster and Stucco.
TRUS-CON PRODUCTS, for Waterproofing and Finishing Concrete.

Our engineers will advise and co-operate with you in every way to secure the best construction at the lowest possible cost. Write us for catalogues, estimates and suggestions free

Two of the many Kahn System Structures erected in Canada

O. E. Tench, Newmarket, Architect
Bowman & Connor, Toronto, Consulting Engineers.

Mill and Storage Bins for Western Canada Flour Mills
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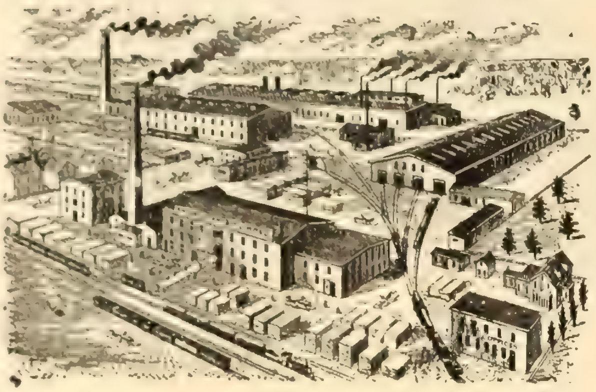
Trussed Concrete Steel Co., Limited

Head Office and Works: WALKERVILLE, ONT.

Branches: Toronto, Montreal, Winnipeg, Vancouver

Rhodes, Curry Co., Limited
Lessees



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SCHOOL DESKS A SPECIALTY

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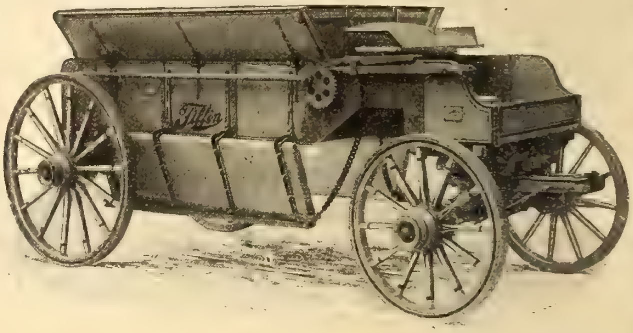
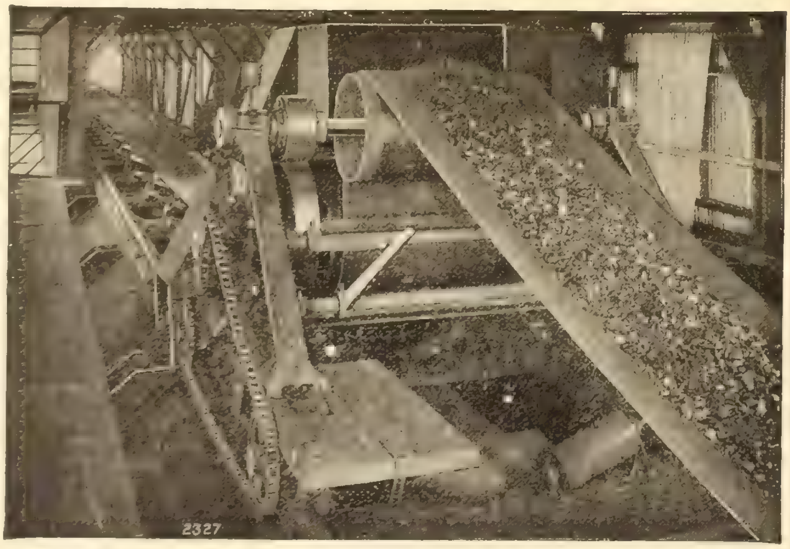
Flushing Machines, Sprinklers
and Municipal Vehicles

are the best builded devices in the United States



The Tiffin Wagon Co.
TIFFIN, OHIO



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Conditions may be Wet or Dry

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The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers

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Hardens with Age. Low Price. Samples and Quotations Free

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High-Grade German Brands for Granolithic and Artificial Stone Sidewalks. SEWER PIPES, CULVERT PIPES, etc. Best English Cements. Best Belgian Cement.

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A DAY'S SUPPLY

Herringbone Lath is perfectly flat.

It never requires pulling into shape.

The interlocking selvage edge requires no wiring between studs.

End lap is provided at the manufacturer's expense.

One row of staple holds the ends of both sheets.

Three staples per stud between salvages are ample.

Net saving — nearly half the attachments.

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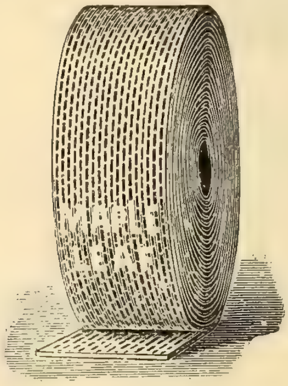
"MAPLE LEAF" Brand Stitched Cotton Duck Belting

is the strongest, truest running, and most economical belt on the market for transmission of power, carrying etc.



It costs much less than rubber, leather, balata, and other lines of fabric belting.

Being thoroughly waterproof "**MAPLE LEAF**" is equally good for indoor or outdoor work.

Write for samples, prices and further particulars to the sole manufacturers.

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Cofferdam at Southampton, 4[illegible] feet x 12 feet, 14 feet deep.

We are experts at this work and before you close a contract, get our figures. We also manufacture Standpipes and Elevated Tanks, Steel Piling, Boilers, etc.

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All International Varnish Products are Sold in full Imperial Measure Cans

That means more satisfaction and better goods for your customers at the same money.

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**Used by the Largest Mining Companies and Hydro-Electric Plants.
Also Extensively for Dredging, Exhaust Steam, Compressed Air, etc.**

Sizes 3 to 42" Diameter up to ¼" in thickness
Easily installed and securely connected with our Forged Steel Flanges or All Steel Bolted Joints.

Write for our Catalogue 5-A and prices on your requirements

AMERICAN SPIRAL PIPE WORKS - MAIN OFFICE—CHICAGO
NEW YORK OFFICE—50 Church Street

55,000 cu. yds. of Concrete

placed in the foundation of the Municipal Building, New York City.

Doud's "Acme" Center Dump Bucket

used on this construction.

This bucket gave complete satisfaction.

(Extract from letter referring to above.)
"Your bucket in every way has given perfect satisfaction; it is all that the word 'Acme' implies; in my eighteen years experience I have used no better."
W. S. Downing.
(Signed)
Supt. Construction
The Foundation Co

Load deposited perfectly central. Dumps into wagons, hoppers and forms with the same exactness

Write for Catalog—Ask about our new Patent Concrete Cart

The Acme Equipment & Engineering Co.
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SELLING AGENTS
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Permanent Water Proofing of Concrete

The continual expansion and contraction of a concrete surface, due to varying temperature, will in a short time shed its waterproofing compound whatever it is.

Make your concrete waterproof right through by incorporating in your mixture

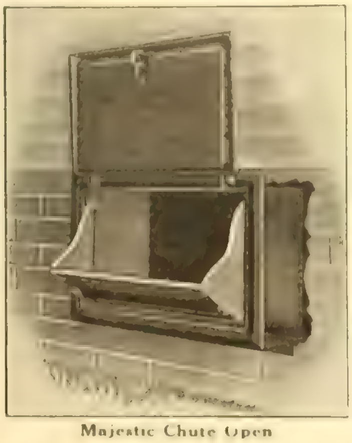
Guelph Hydrated Lime

which is very fine and fills all voids.

It improves the appearance of your job by producing a better color and it lessens the cost because lime is cheaper than cement.

Specify **Guelph Hydrated Lime** when ordering from your dealer.

Standard White Lime Co.
Guelph - Ontario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EQUIP YOUR CELLAR

with one of our "Majestic" Coal Chutes which is the neatest and best equipment for any cellar. It is easily installed in either new or old houses. It permits coal, wood or vegetables to be put into the cellar without disfiguring the building in any way. And unlike a glass window it cannot be broken. The hopper can easily be removed if desired to put in very coarse coal or wood, or if a waggon chute is used. It swings back into the chute and allows the door to be closed. The door is made to lock when opened upward, and protects the wall or siding above the chute, and can be released only when closed. We make three standard sizes. There's a size that's just right for your cellar and your requirements. No. 1—22 x 16 x 13 No. 2—27 x 16 x 13 No. 3—33 x 22 x 18

Send [illegible]

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Start Right

by specifying Hamilton Pressed Brick for every job where a clean, smooth and distinctive effect is desired.

Hamilton Pressed Brick is made from shale, not clay, rich in Iron Oxide free from so called Soda. Besides furnishing this high class product we can fill your orders promptly. Connections with T. H. B., C. P. R., G. T. R., M. C. R.

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is being largely used for Public Library Buildings, a larger ornamentation being possible at a small price. Corinthian Stone is acknowledged to be the best artificial stone, has tested over 4,000 lbs. crushing strength to square inch. Any size, shape or quantity can be supplied. :: :: :: ::

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All the stone for this building was supplied by

The Corinthian Stone Co.

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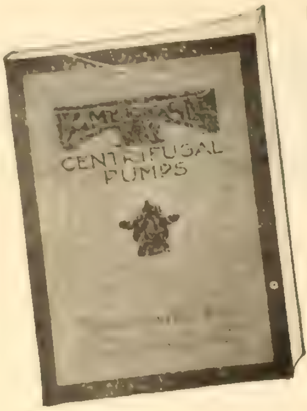
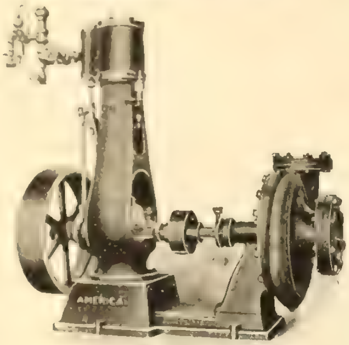


The Highest Development of the Most Modern Pump

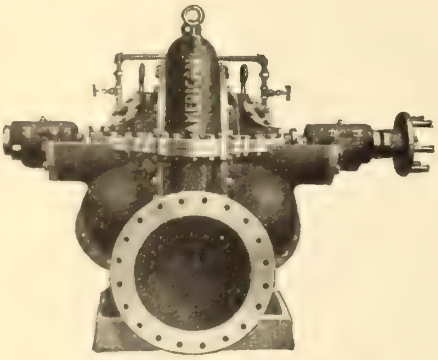
There is abundant proof that the most economical type of pump—cheapest to install, cheapest to attend and cheapest after a period of years when you have figured all the cost—is the Centrifugal pump and the highest development of this type is the



American Centrifugal

The "American" Centrifugal is characterized by having sides and edges of the impeller and interior of casing machined true and adjusted to each other with smallest possible clearance, preventing back flow; and having flowlines worked out to the easiest possible curves preventing swirles and eddies in the water passages.

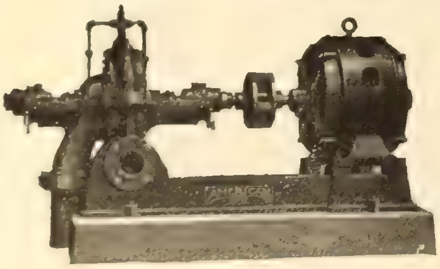
AMERICAN
WW



These features combined with perfect Mechanical adjustments give them higher efficiencies than any other and enables an "American" Single Stage Centrifugal to operate against as high heads as 2-stage, 3-stage or even 4-stage Centrifugals of some other makes.

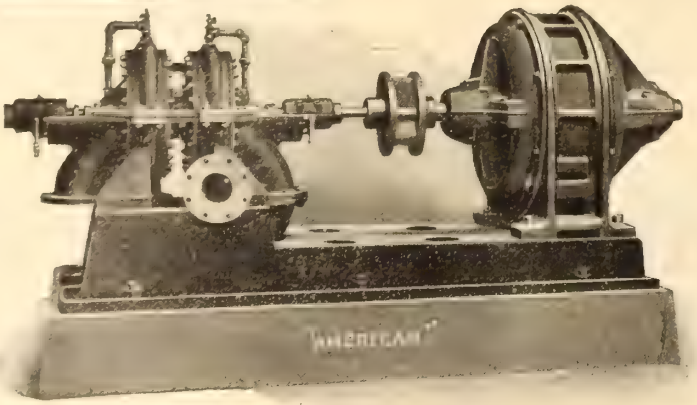
"American" Centrifugals are made in over 50 styles in both horizontal or vertical types in any size to the largest built, in any number of stages and equipped with any power.

Before you buy any kind of large capacity pump, write for General Centrifugal Pump Catalog No. 117, the most complete ever issued. It is very certain to save you money.



The American Well Works

General Office and Works, Aurora, Ill. Chicago Office, First National Bank Bldg.
Canadian Sales Agency, 234 Craig Street West, Montreal.



AMERICAN
WW

Catalog Directory

- **Catalog 105**—Well Drilling Machinery. 8 x 11 in. 196 pages.
- **Bulletin 106**—Standard Types of Well Drilling Machines, 6 x 9 in., 36 pages.
- **Bulletin 107**—Standard Types of Centrifugal Pumps, 3¼ x 6 in., 16 pages.
- **Bulletin 108**—Centrifugal Turbine Pumps, 8 x 11 in., 8 pages.
- **Bulletin 109**—Sand and Dredge Pumps, 8 x 11 in., 8 pages.
- **Catalog 110**—Deep Well Pumps, 8 x 11 in., 68 pages.
- **Bulletin 110 A**—Standard Types of Deep Well Pumps, 3¾ x 6 in., 16 pages.
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- **Catalog 115**—Air Compressors, 8 x 11 in., 84 pages.
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GARTCOSH
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For use in iron and steel works, foundries, railroad shops and by all furnace users. They possess the three qualities of a perfect fire brick. First, **no melting.** Second, **no cracking** and **splitting off.** Third, **high reflective power.**

Stocks carried by all principal dealers

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Canada's Pioneer and Leading Concern in the Marble Business

They will sell you Quarry Blocks, Sawn Marble, Marble completely finished for either interior or exterior purposes, and, if necessary, they will contract to set it in place.

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Prompt Deliveries Write for prices

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Hardwood Flooring
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We manufacture the above from Select Stock.

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Sand and Gravel

Lime
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Our prices are right and our service good.

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Cast Iron Fittings and Valves are Right

Have you seen our
"Everlasting" Blow-off Valve
SIMPLE AS A. B. C.

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GUELPH - ONTARIO

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All Sizes

¶ For Roadways and Sidewalks also specially adapted for

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The name W. E. Seagrave guarantees the Best, the Lightest, the Strongest, the Most Economical in Operation and Maintenance. No order too large. No order too small. Consult us before buying.

Automobile Fire Apparatus and Motor Driven Vehicles of all kinds, our latest Production.

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We are manufacturers of a very complete line of tents for engineers' and contractors' use and can make shipment the same day as order is received.

We also make engineers' and surveyors' clothing, in fact we can fit you completely for camp and survey trips.

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It will interest you

Woods Limited
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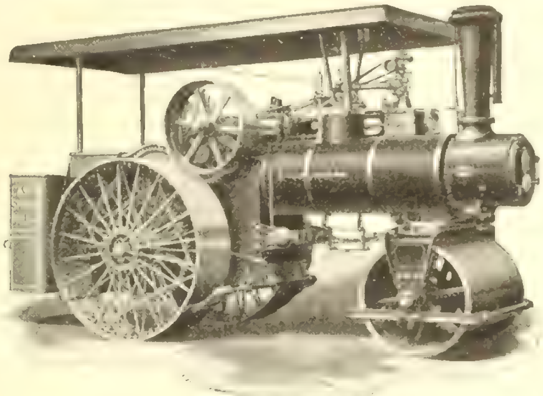

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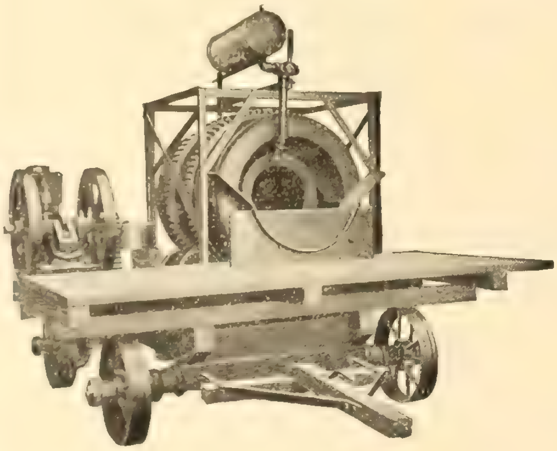

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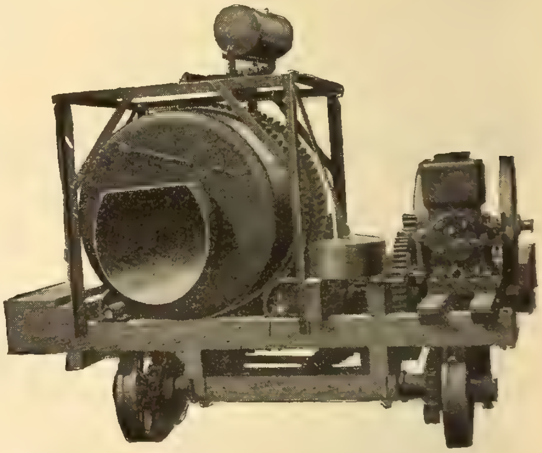

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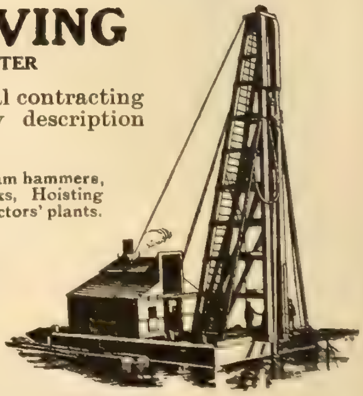

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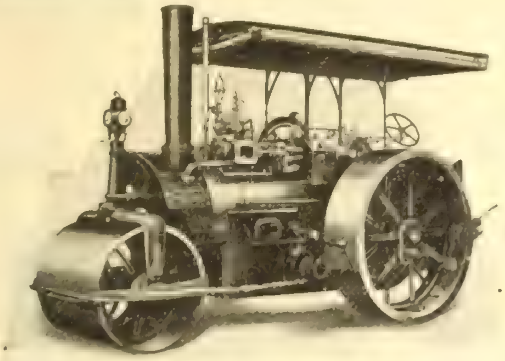

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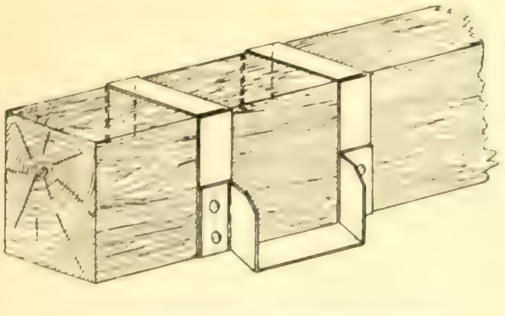
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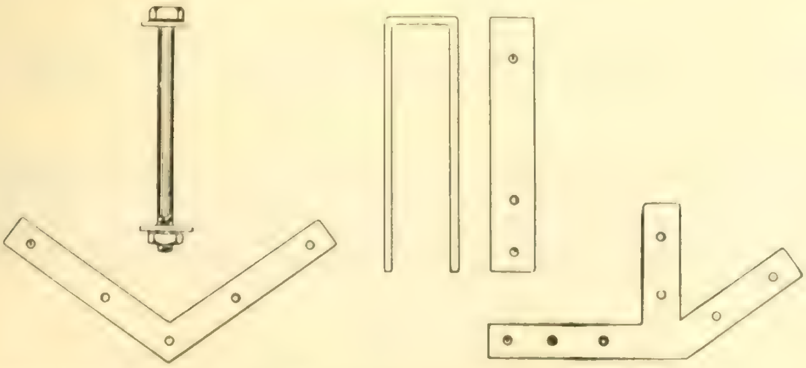
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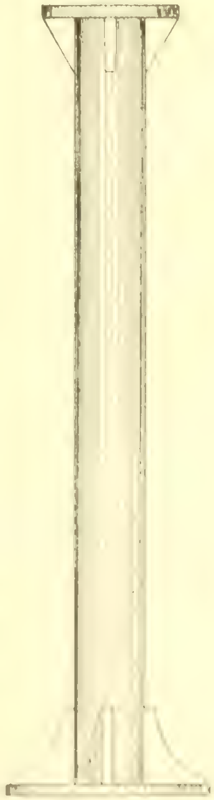
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26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.35	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
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96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

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	Mont'l.	W'p'g.	Mont'l.	W'p'g.
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40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts —Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

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No. 4½ Fuller's ....net 2.25
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⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

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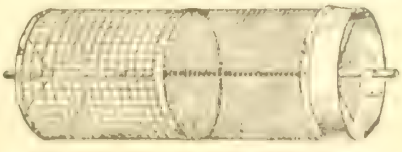

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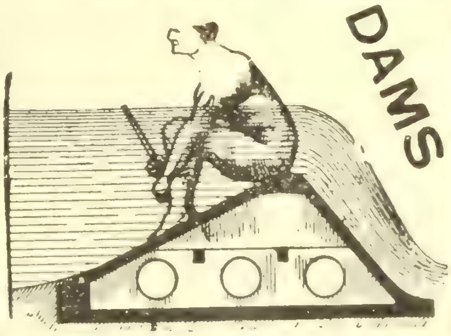

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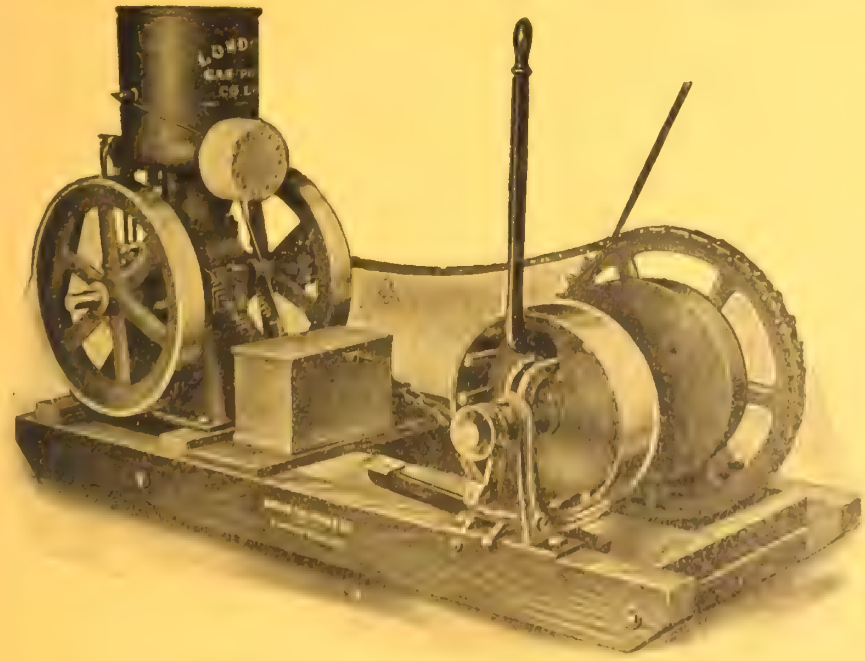

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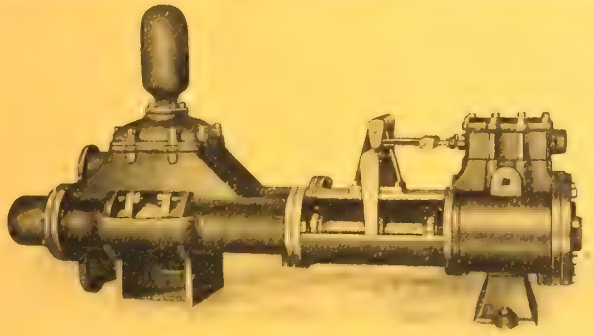

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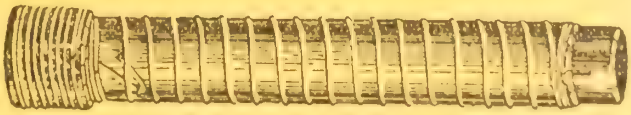

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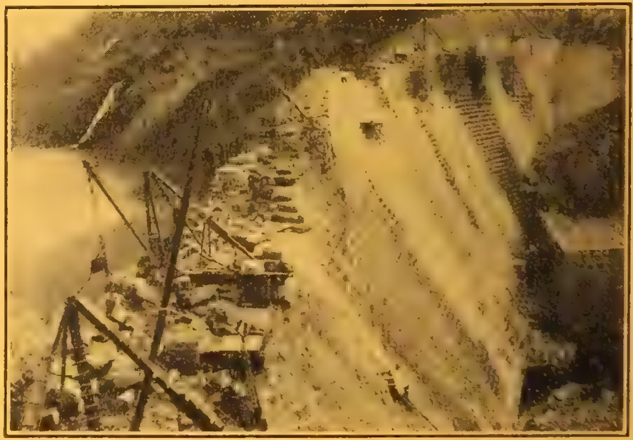

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It is not alone for our own convenience that we make this suggestion; firms who manufacture or deal in such articles will find it to their own advantage to have this information in the hands of our Information Department, thereby enabling us to hand on to them from time to time enquiries for such materials as they severally make.

In sending catalogues, literature or information, please address same to "Sales Department."

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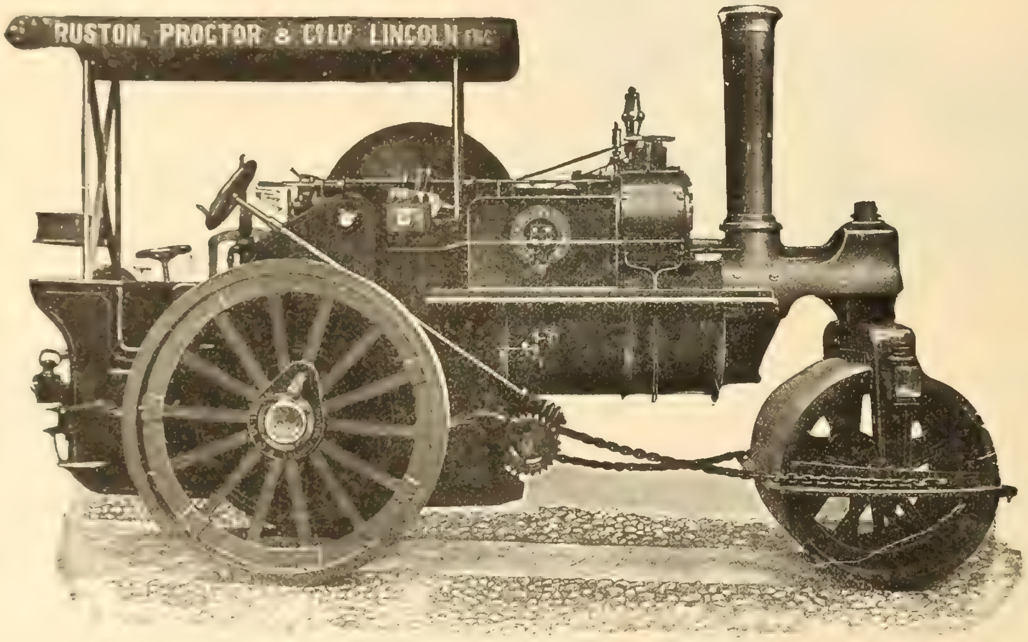

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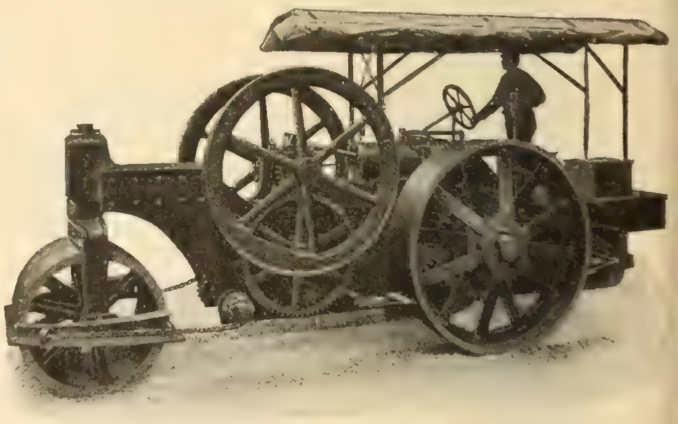

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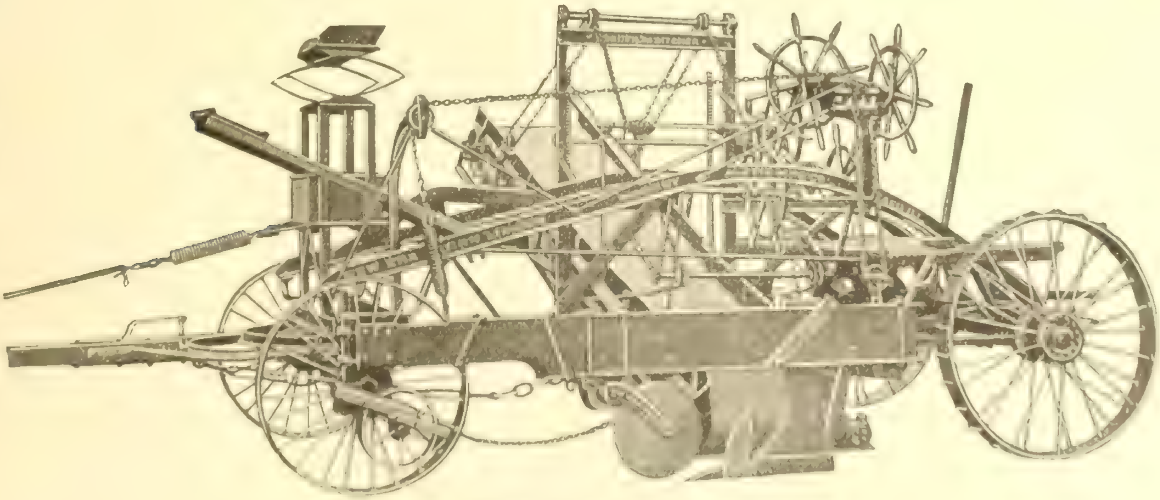

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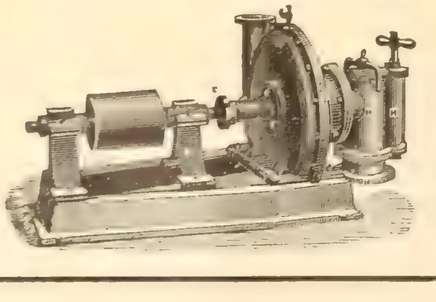

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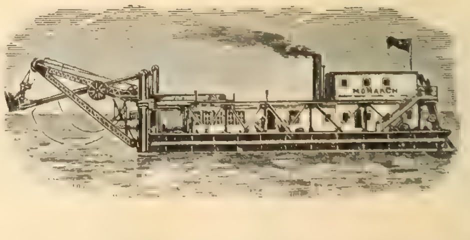

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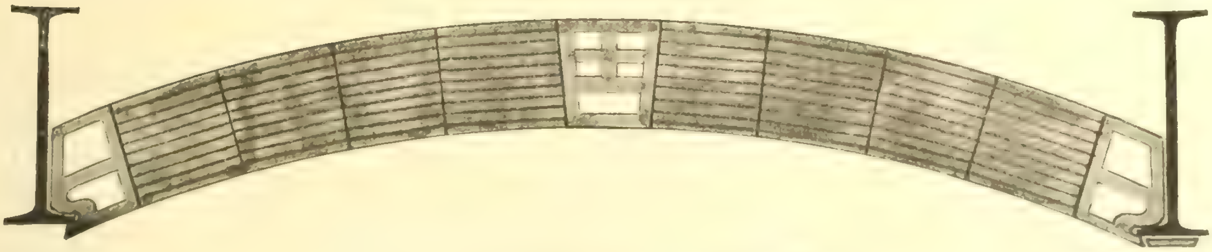

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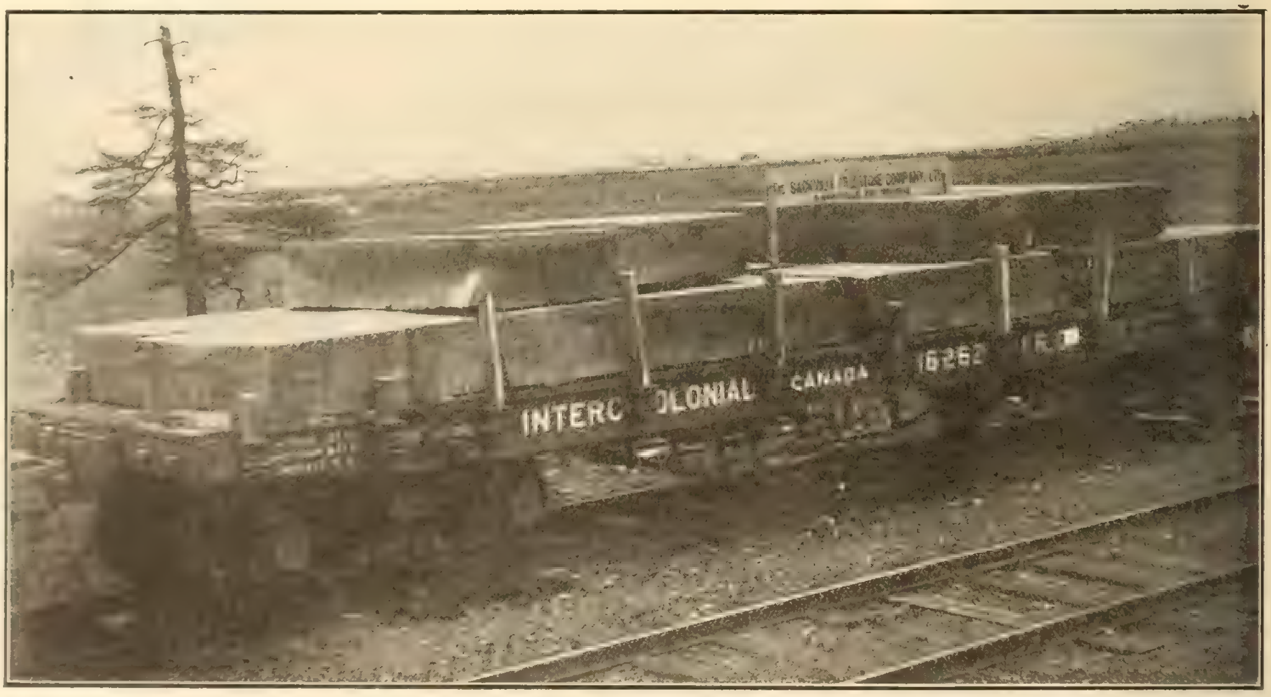

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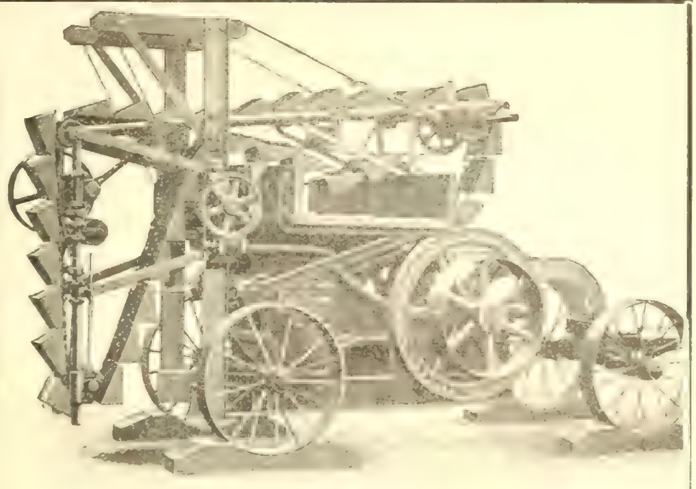

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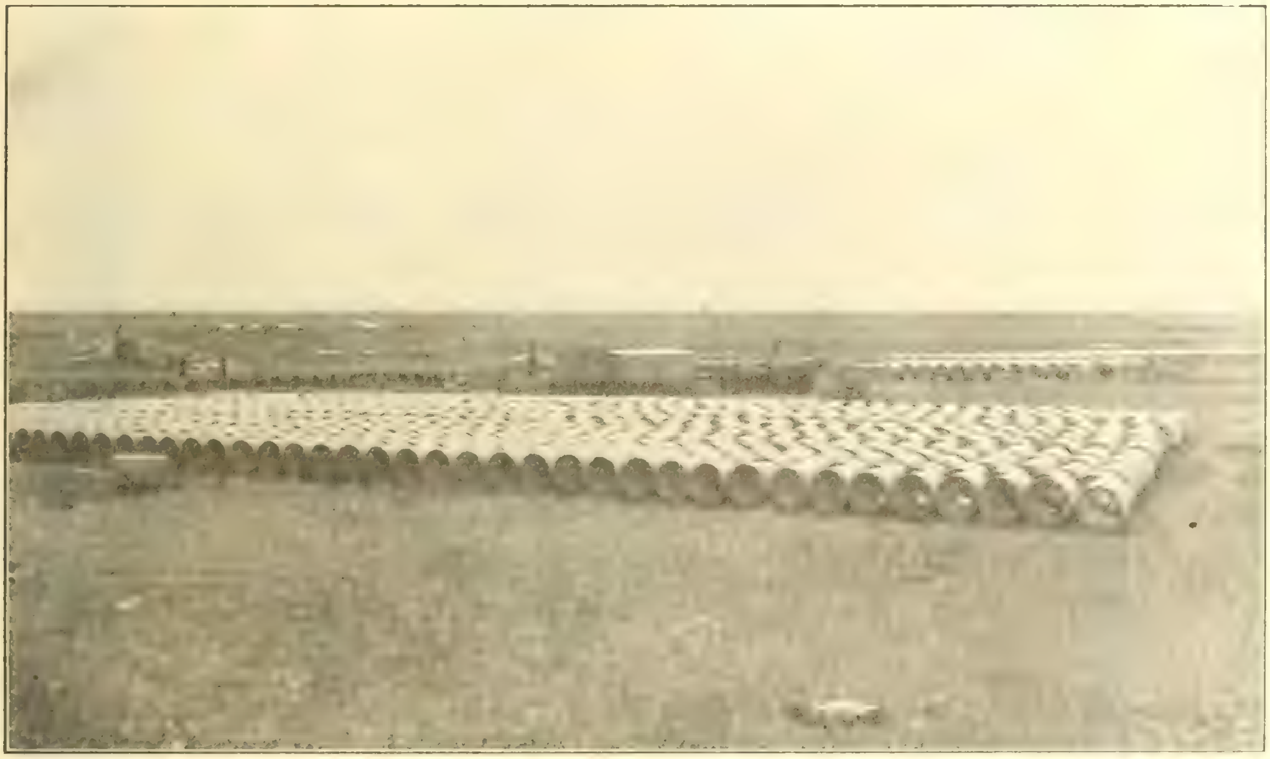

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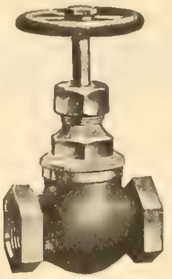

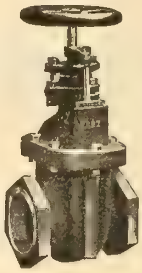

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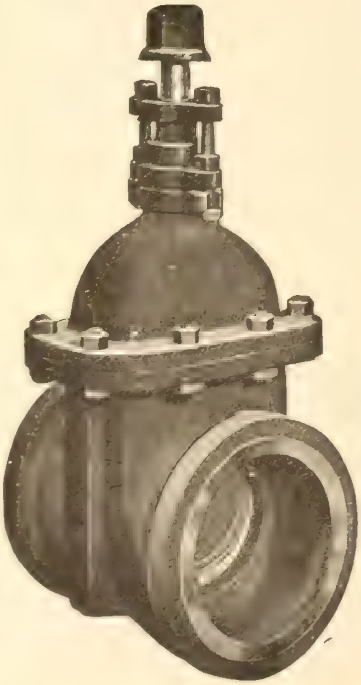

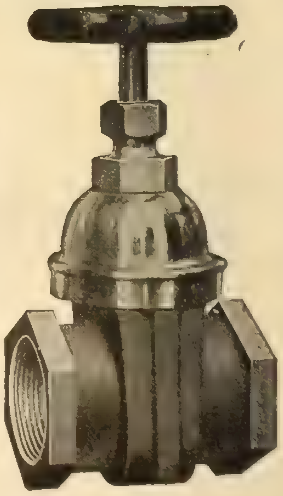

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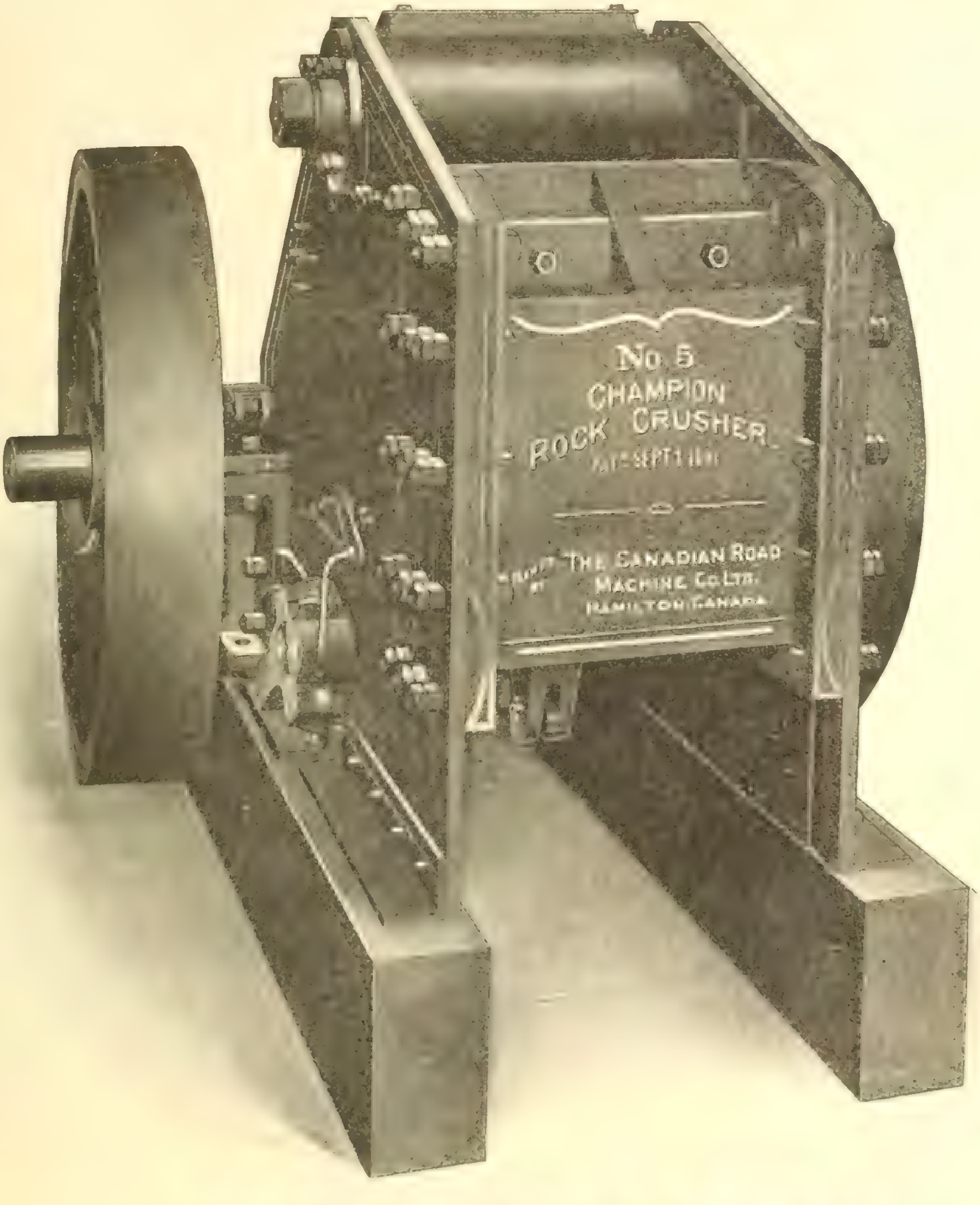

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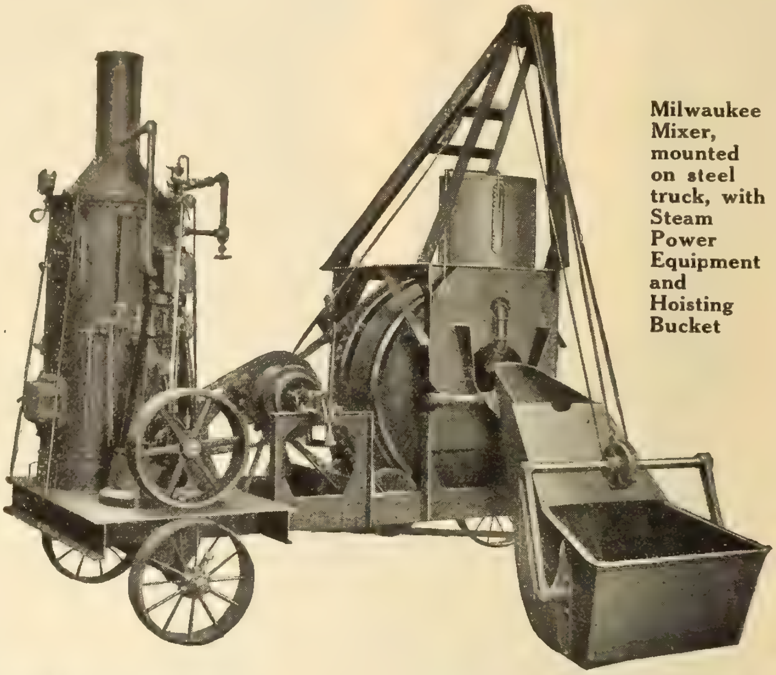
Milwaukee Concrete Mixer

Rosebery's Unequaled Proposition and one that is booking the orders. Write for 1911 Catalogue. Just out.



Milwaukee Mixer, mounted on steel truck, with Steam Power Equipment and Hoisting Bucket

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Milwaukee Concrete Mixer and Machinery Co. - Milwaukee, Wis., U. S. A.

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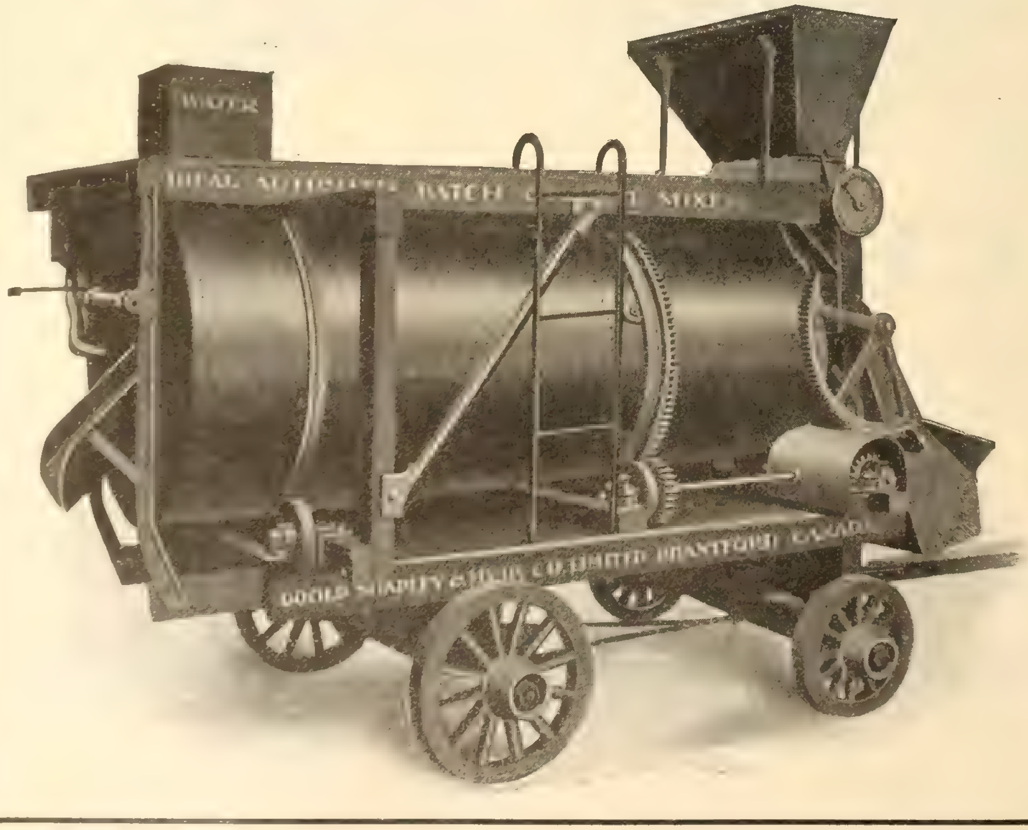
CONCRETE MIXERS



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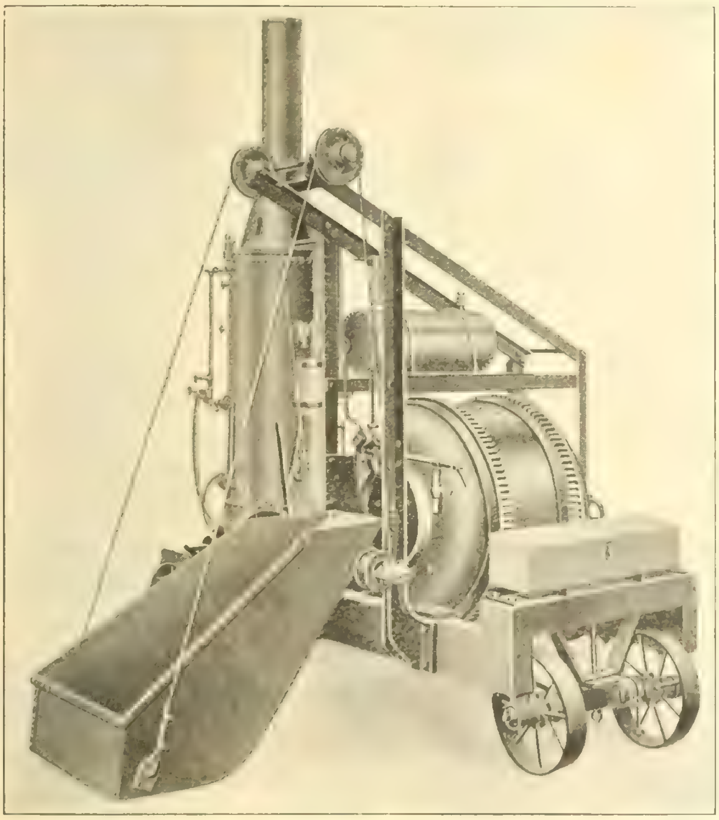

Concrete Mixer theories grow into definite mixing knowledge when every mixing action is a known positive mechanical force.

There's an individuality about Koehring Mixing—it's known mixing.

The drum is a plain cylinder with heavy cast iron heads, but bear in mind, it's made without deflecting faces or other obstructions, to limit the end-to-end mixing.

The mixing blades are so arranged that they not only lift and pour the aggregates from the side but carry them alternately from end-to-end and break them over against the heavy heads.

There's no guess work about it—no rolling over in the centre of the drum, every action of the aggregates is performed by a known positive mechanical force.

But there's another mixing than this in the Koehring Mixer.

When not in discharge position, the inner end of the discharge chute is tilted downward.

Material carried up by the mixing scoop at the side is discharged onto the inwardly and downwardly extending chute and decends from the inner end in a continuous flow, the entire width of the chute, and falls to the bottom at right angles to that from the mixing scoops and the end-to-end mixing.

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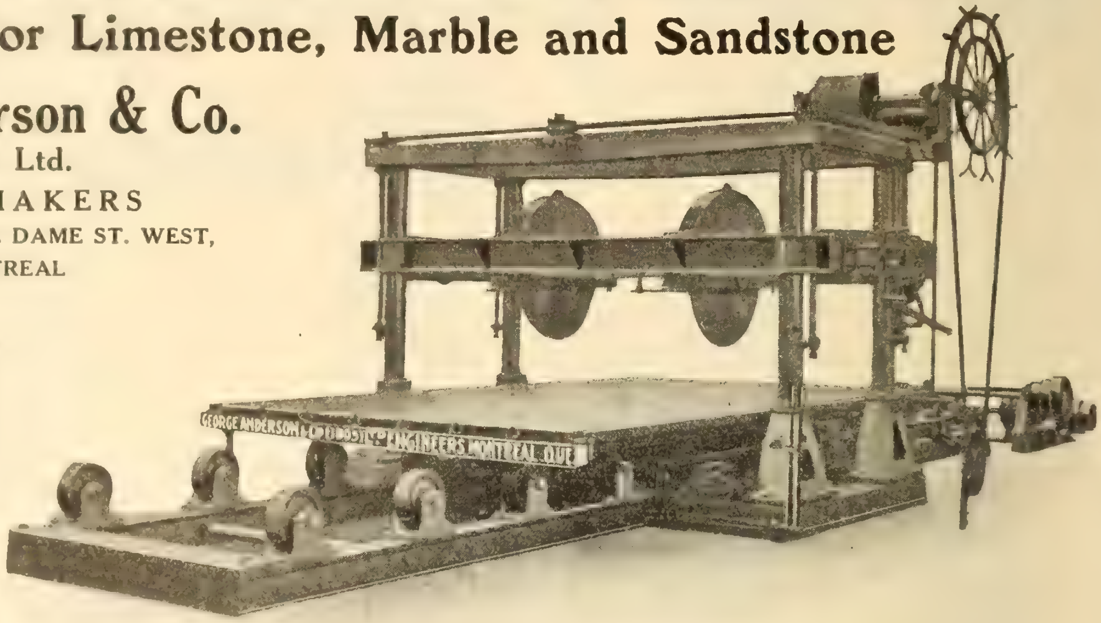

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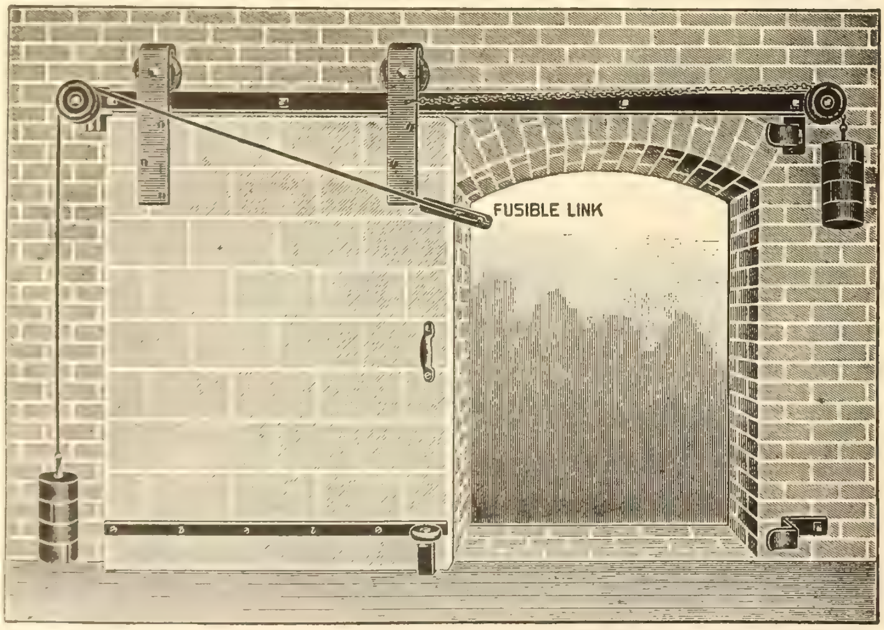

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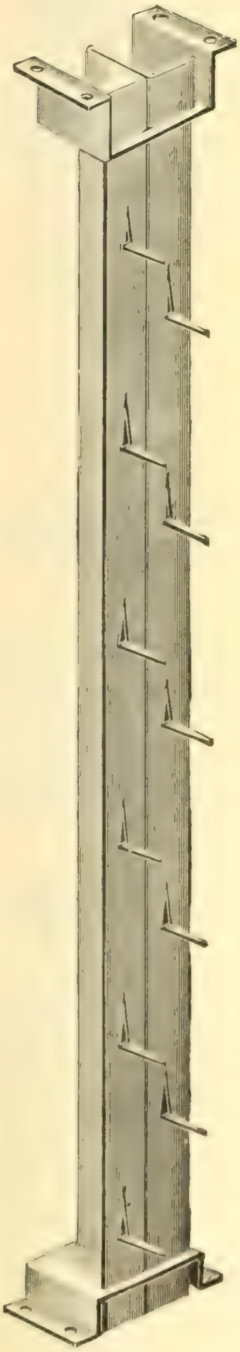

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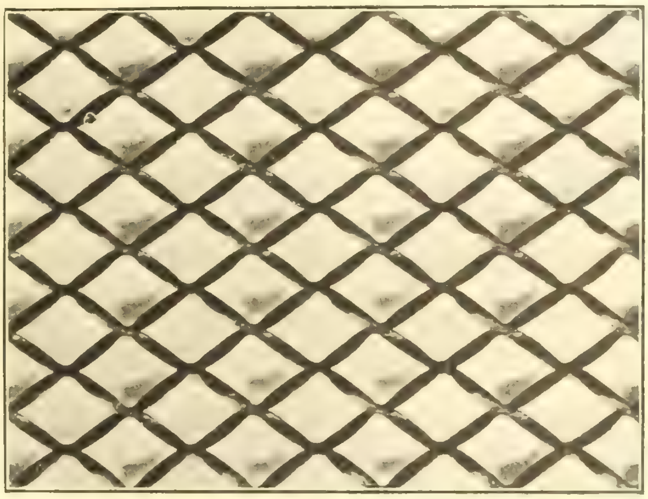

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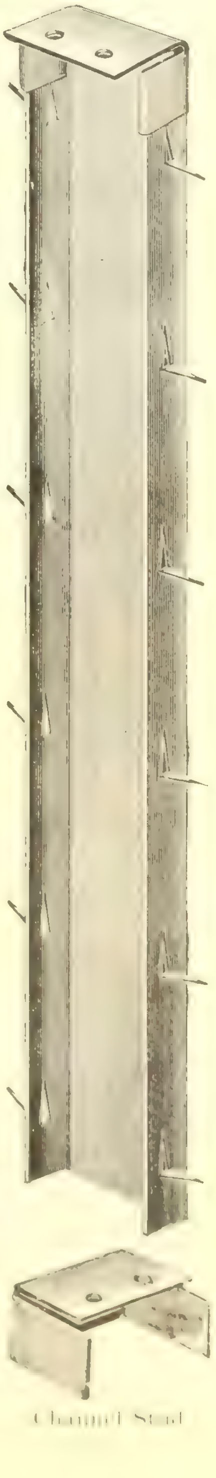

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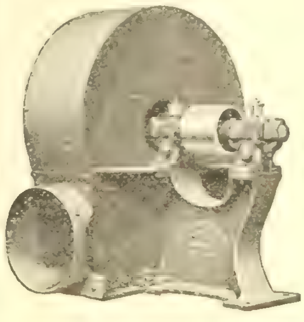

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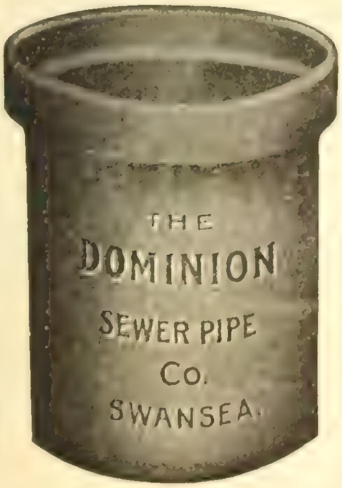

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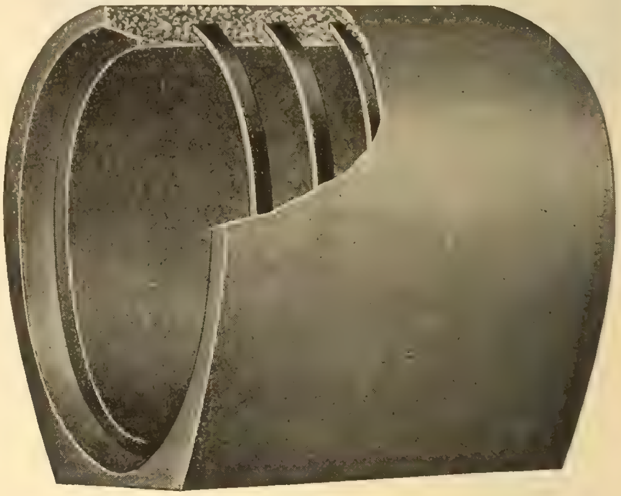
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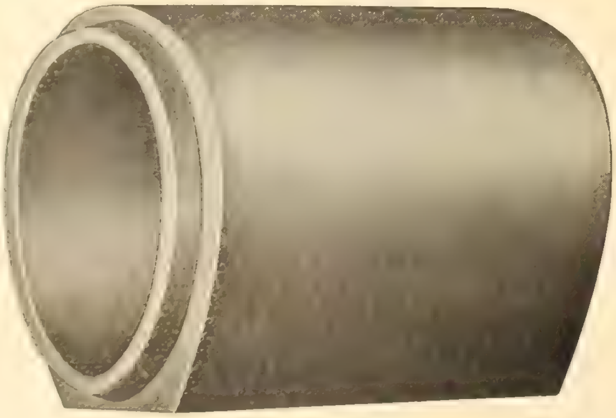
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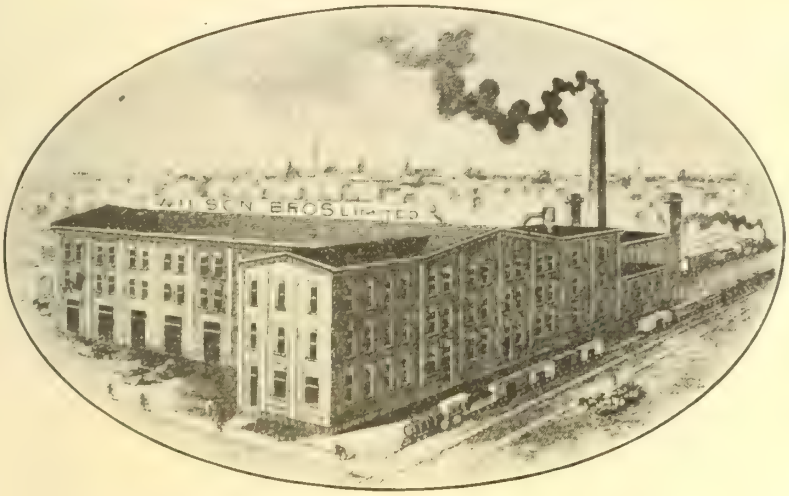

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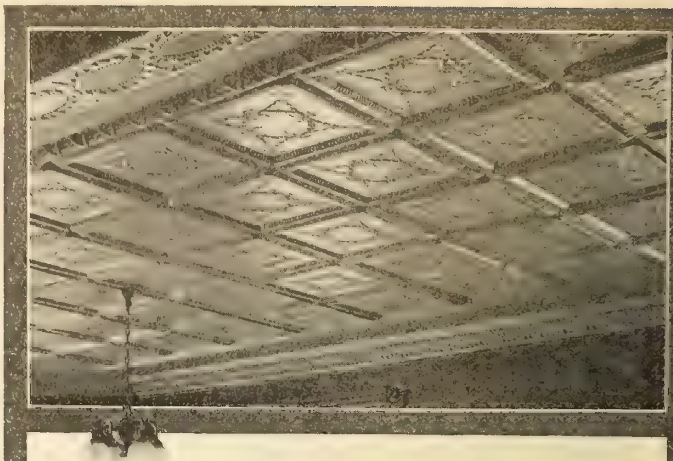

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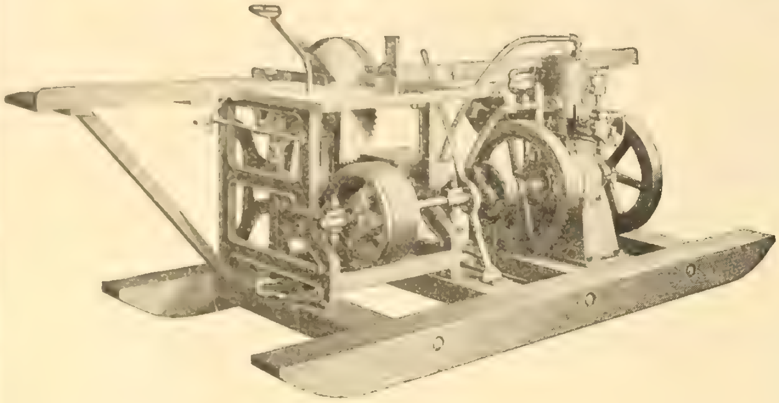

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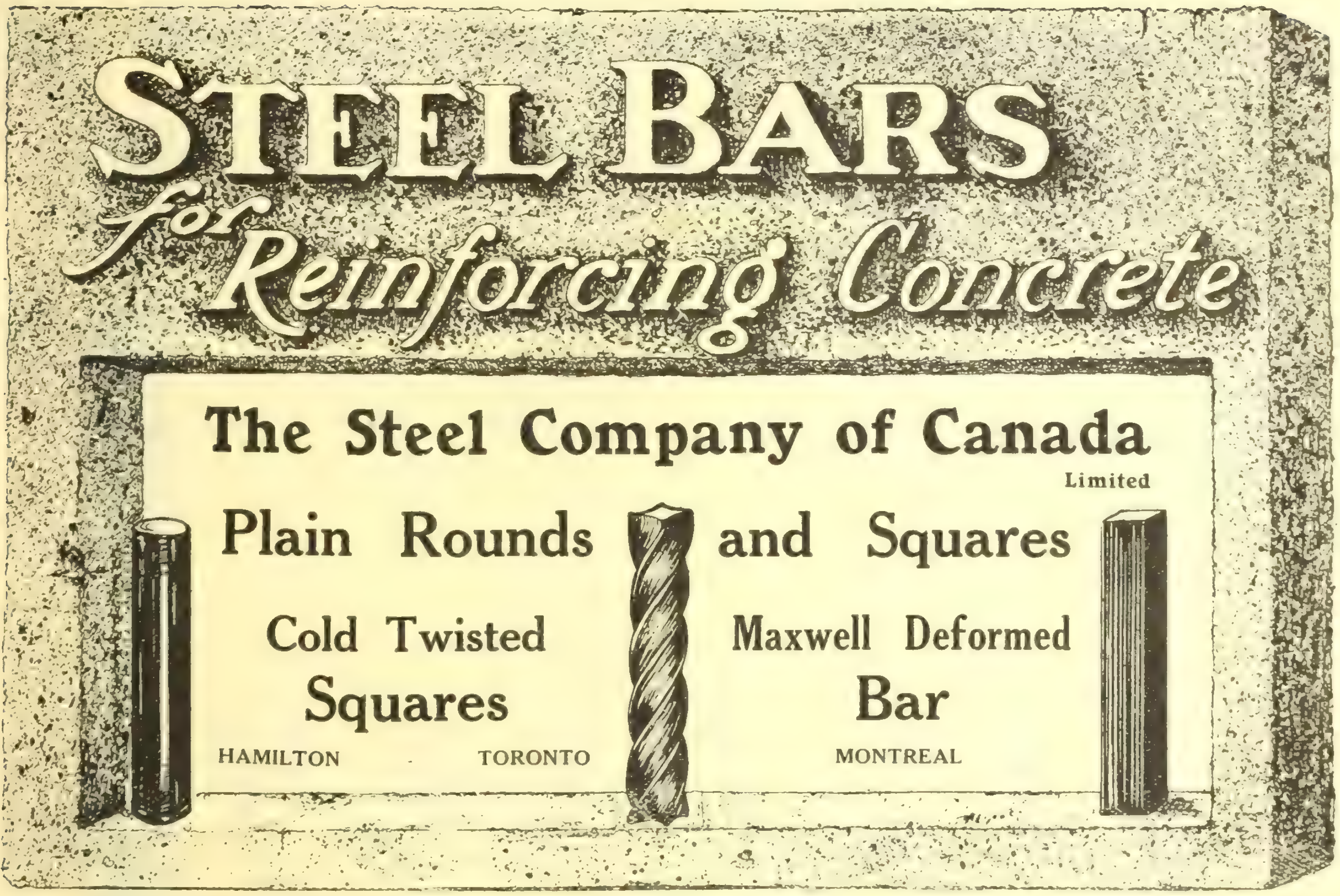

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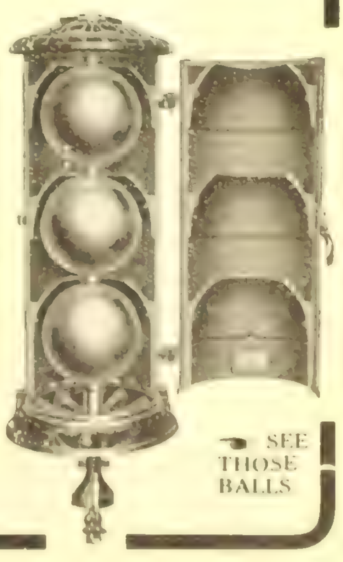

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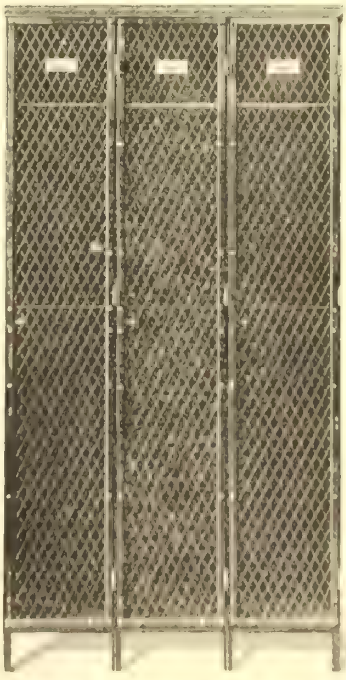

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Contract Record

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Vol. 25 April 26, 1911 No. 17

The Attitude of the Engineer in the Supervision of Contract Work

We are frequently reminded of the necessity for the careful inspection of concrete work, and we are inclined to endorse all that has been said in this connection. The time will never come when we shall be able to dispense with resident engineers and inspectors. Little enough, however, is done towards bringing the supervising engineer into more harmonious relations with the contractor. Certain it is that a helpful attitude on the part of the supervising engineer will accomplish far more with the contractor than a whole squad of inspectors. The contractor and his staff are quick to detect the willingness of the engineer and his assistants to assist them in the various little ways that offer in the execution of important work. It is within the power of the engineer to interpret specifications on any work in such a way that the contractor may make or lose a good profit, and with no benefit to the construction. A contractor is made of flesh and blood just as is the engineer; he is just as human, and just as susceptible to decent treatment. Moreover, his resentment of harsh treatment and unfair decisions is no more than one might expect from an engineer if the conditions were reversed. The engineer in charge of construction whose decisions are always against the contractor, irrespective of the latter's rights, and whose readings of the specifications are, of intent, one-sided, is not worthy of his profession.

The contractor, having assumed all contingencies, should be treated with a measure of liberality and should always have the benefit of the doubt. More should not be expected of him than is conveyed by a reasonable interpretation of the contract. He should not be expected to shoulder the slightest omission on the part of the engineer, and he should be regarded like Caesar's wife—as being above suspicion until proven otherwise.

A large percentage of bad results can be charged directly to the engineer and poor materials. It is the province of the engineer to see that the quality of materials and finished work comply with the plans and specifications. He should decide all questions pertaining to the quality of materials, workmanship and construction, but he should keep clear of the management and direction of the work, and any and all disputes arising between the company and the contractor that do not effect the quality of the work done. For instance, the engineer makes plans for a river pier with pile foundations, concrete base, stone shell and concrete cores, constructed according to printed specifications. Does it make any difference to him whether the contractor makes a double crib and back fill, or drives steel sheet piling, just so long as the finished work is completed according to plans and specifications? Does the engineer presume to dictate to the contractor how he shall manage his work, and then make the contractor responsible for the mistakes of both the first and second parties without just compensation?

Certain companies and engineers—happily they are in the minority—think it smart to keep from contractors certain information, other than plans and specifications, that if known to contractors when bidding on work would materially change the price of construction, resulting later on in delays and loss of time and money. Any company or engineer who knows from past experience that difficulties will be in the way for the successful contractor, and does not acquaint him with same before the tender for the work is made and contract entered into, is dishonest. Sooner or later it is sure to be found out, and the word passed from one contractor to another, with that absolute certainty of paying extra for contingencies in the future. The engineer who takes pains to explain to the contractor, not only the meaning of the plans and specifications, but also all the features of the physical conditions reasonably sure to be met with at the site, uniformly obtains for his clients the lowest safe bid that would be paid for the work. Such conditions guarantee good work, the best feelings and rapid construction.

Contract Bonds—A Correction and a Note

In another column will be found a letter by "Building Contractor," in which our attention is drawn to a misrepresentation of a former letter of this writer published in our issue of April 5. As an illustration of the attitude of the bonding companies, "Building Contractor" in his first letter cited the case of a bridge concern which was bonded for $100,000, but which upon the collapse of the structure was unable to recover owing to the fact that the company had not been notified. Owing to a typographical error an extract from this letter read as follows: "The case was discussed in all the papers but the company did not pay, they having received timely notification," instead of "they not having received timely notification." Our apologies to "Building Contractor."

Regarding the premium rate for contract bonds, discussed in the concluding paragraph of the letter published in this issue, it would seem necessary to explain that the one-quarter of one per cent. per annum charge is based on the amount of the contract. The amount of the bond itself may be anywhere from 10 to 50 per cent. of the contract, as required. The figures referred to by our correspondent were those of bond liability and premiums, not of contract totals and premiums.

Another Record-Breaking Building Year

First Quarter of 1911 Shows Net Gain of 20 per cent. According to Returns from Twenty-Six Leading Canadian Cities

According to official returns submitted to the Contract Record by twenty-six leading cities of the Dominion, the expenditure on building for the first three months of 1911 shows an increase of twenty per cent. over the corresponding period of 1910, the totals being respectively $17,139,655 and $14,340,778. In view of the fact that 1910 was Canada's greatest building year, and that during that year the total expenditure on building was nearly one hundred millions—an increase of 44 per cent. over 1909, the present showing can only be regarded as eminently satisfactory and encouraging. True, a number of cities record decreases, but these are attributable either to abnormal inflation during 1910 or to recent conditions of exceptional occurrence. The developments of the season alone will show whether Winnipeg's decline is attributable to the former cause. During 1910 the western capital expended on building over fifteen million dollars, an increase of no less than 64 per cent. over 1909. Such a record, even for a city like Winnipeg, is difficult to maintain. We would not infer for one moment, however, that the city is falling off in any respect; on the contrary we believe that it has entered upon an entirely new era of prosperity, but we do think that it would be unreasonable to take nothing but a phenomenal increase as evidence of development and progress. Winnipeg's comparatively poor showing is attributable perhaps in a measure to the somewhat backward season. Be this as it may, the greatest optimism prevails in the city, and those who are in close touch with trade conditions assert confidently that by the end of 1911 the year will surpass 1910 in building volume.

City	Mar. 1910	Mar. 1911	3 mos. '10	3 mos. '11	Increase % for 3 months.	Decrease % for 3 months.
Vancouver	$1,806,106	$2,147,798	$3,318,212	$4,607,330	39	
Toronto	1,583,165	2,210,770	3,125,693	3,638,940	16	
Montreal	674,804	1,101,577	1,110,344	2,109,845	90	
Calgary	415,800	1,012,260	692,100	1,641,960	137	
Winnipeg	2,543,150	1,007,400	3,067,050	1,639,600		47
Regina	329,650	545,025	382,490	622,225	63	
Victoria	244,760	279,945	525,505	614,340	17	
Edmonton	264,435	396,825	337,555	519,055	54	
Hamilton	289,390	350,300	346,040	465,000	34	
Ottawa	219,350	134,475	374,200	228,075		39
Fort William	92,585	166,850	162,200	202,175	25	
Lethbridge	124,000	81,500	212,605	140,000		34
North Vancouver	....	47,700	....	116,715		
Windsor	27,225	60,250	37,975	113,625	199	
Moose Jaw	58,825	74,100	69,875	87,100	25	
London	139,700	65,638	221,832	85,863		61
Quebec	25,100	48,000	43,300	85,000	96	
Brantford	11,470	43,445	26,670	60,645	127	
Halifax, N.S.	43,800	22,000	88,975	36,600		59
St. John, N.B.	48,250	13,400	94,750	30,200		68
Port Arthur	5,365	14,810	5,365	20,360	279	
Sydney	17,935	12,440	20,910	20,220		3
Kingston	14,850	19,172	20,875	20,102		4
Peterborough	10,327	6,655	17,477	13,210		24
St. Thomas	15,500	9,850	20,200	12,300		39
Stratford	6,310	8,610	18,580	9,170		51
Totals	$9,011,852	$9,880,795	$14,340,778	$17,139,655		

Total Increase of first quarter of 1911 over corresponding period of 1910, **20 per cent.**

In view of recent developments at Ottawa a decrease of 39 per cent. for the first three months of 1911 will occasion little surprise. It is hinted in some quarters that there is not so much confidence in the federal capital since the birth of the reciprocity pact, but upon such a delicate matter we hesitate to commit ourselves.

The city of Lethbridge has had some trouble with labor and expects to more than retrieve itself later in the season.

With the worst told we turn to the achievements of Vancouver, Montreal, Calgary, Regina, Edmonton, Toronto, and even Hamilton, and find records which amply compensate us for Ottawa and elsewhere. Easily the most significant thing is Vancouver's position at the head of the table, with an outlay of nearly one million dollars more than Toronto, which occupies second place, and two and a half millions in excess of Montreal, which comes third. It is of interest to recall that Vancouver occupied the leading position at the end of the first quarter of 1910, while at the close of that season it took fourth place among Canadian cities, with an expenditure of over thirteen millions and an increase of 81 per cent. for the twelve months. These figures represent solid facts, which stand as a monument to the enterprise of Vancouver and as a certain forecast of the great future to which that city is destined.

Toronto spent more than twenty-one million dollars on building during 1910, and the increase of 16 per cent. for the first quarter of 1911 is identical with that recorded for the whole of last year. The steady progress made during the last year or so can only be regarded with satisfaction and as an augury of future progress and prosperity; particularly so, having in view the favorable conditions obtaining in the supply and labor markets.

Of the other eastern cities particular mention must be made of Montreal, whose outlay on building during the first quarter of 1911 was nearly double that of the corresponding period of last year.

Calgary, "the City of Certainties," justifies its assumption of this noteworthy title by taking fourth place in the table, with an expenditure of $1,641,960, and a gain of 137 per cent. The development of Calgary during the last decade has been phenomenal and we believe that even greater things will be accomplished in that city within the next few years. (In 1901 the population of Calgary was 4,091, and in 1910, 51,000—an increase of 1,253 per cent., since we are dealing in percentages). Calgary's building outlay during 1910 was over five and a half millions. During 1911 it is confidently expected that it will be ten millions.

A final word should be said for Regina, which occupies sixth place in the list of cities, with a gain of 63 per cent.—a most creditable record.

The general optimism prevailing among city engineers, building inspectors and others may be gauged from the reports which follow:

Vancouver, B.C.—S. H. Jarrett, building inspector, writes: "Building conditions were never better, or prospects brighter, than at the present time. The indications are that the percentage of increase for the first three months will be kept up for some time. Everything seems to indicate that Vancouver is going to maintain the position reached in January, of having by far the largest per capita total of any of the large cities on the continent. There is no doubt that this city is now entering upon a most marvellous and rapid development."

Toronto, Ont.

P. L. Fraser, Secretary Builders' Exchange, writes:—"The amount of building permits issued by the City Architect for the first three months of the year is the best criterion of what is really happening in the building industry in Toronto this year. It was thought by many that the building record made last year would not be approached for some time to come, but from present indications and the statistics handed out by the City Hall Building Department, this year's record bids fair to equal, and even surpass, that of last year. There seems to be no let-up in the number of residences that are being erected and the number to date this year exceeds that of last year for the same period. This is the case in every class of building.

"The outlook is really bright for a busy year. At the present time there does not seem to be anything which will have a tendency to hold up operations. No serious labor trouble is anticipated. Any agreements with the labor unions which lapse this year have been renewed.

"The great difficulty of the contractor will be in obtaining building materials. A scarcity is already foreshadowed and indeed this scarcity is now felt in regard to brick. This commodity can only be purchased at an increase over last year. The price of brick in Toronto is seemingly higher than in other localities, but when the size of the brick and its quality are considered, the market price compares favorably with that of other cities. The prices of other building materials, compared with the prices which obtain in Detroit, which is slightly larger than Toronto, and where building conditions are similar to those here, are nearly on a parity.

"A very optimistic view should be taken by every one identified with the building industry."

Montreal

Office of the Contract Record,
Montreal, April 21, 1911.

The building operations in Montreal which will be proceeded with this summer include the following large operations:

C. P. R., extensions to the Windsor station and Place Viger station and hotel, $1,500,000; Dominion Express Company, new office building on St. James street, estimated cost $600,000; the Transportation Building, to be erected on St. Francis Xavier street, between St. James and Notre Dame streets, estimated cost $1,000,000; Montreal Art Association, new galleries on Sherbrooke street (first section) $300,000; National Bridge Company's Works at Longue Point, estimated cost $100,000; Y. M. C. A. headquarters, estimated cost $325,000; Y. M. C. A. at Westmount, estimated cost $55,000; St. Stanislas de Kotska parish, church to cost $142,000, anad a presbytery, estimated at $35,000; Mr. W. H. Creed, apartment house on Cote des Neiges Road, estimated cost $90,000; Les Artisans Canadiens Francais, head offices at the corner of St. Vitre and St. Denis streets, estimated cost $70,000; St. James Hotel extension, estimated cost $70,000; rebuilding front of General Post Office, St. James street, estimated cost, $300,000; Protestant Board of School Commissioners, extension to Fairmount avenue school, $120,000; Protestant Board of School Commissioners, new school on Christopher Columbus street, estimated cost $70,000; Catholic School Commissioners, new school in St. Edward's Parish,cost $34,000; N. A. Timmens, factory on Clark street, $64,000; J. U. Cartier, hotel and office building, McGill street, $50,000; Pierre Brault, factory, rebuilding after fire, cost $35,000; A. Ramsay & Son Company, Limited, factory, $16,000; Masson Estate, addition to office of Ross & Macfarland, Beaver Hall Hill, $10,000; J. C. McLaren Belting Company, new factory, estimated cost $17,000.

The following table shows the total amount of the value represented by building permits issued during the first three months of 1910 and 1911:

	Jan.	Feb.	March	Total.
1910	$159,510	$274,030	$676,804	$1,110,344
1911	365,840	642,428	1,101,577	2,109,845

This shows that there was an approximate increase in March permits over January of 201 per cent., and an increase for March, 1911, over March, 1910, of 90 per cent.

A glance over the above list of extensive operations shows that there will be a very heavy business in the building line in Montreal this summer. It should be mentioned that the largest buildings will be constructed principally of steel and reinforced concrete. In most cases the contracts call for the completion of the work within a year, and much of it will be finished by the fall.

In addition to the work under way in Montreal proper, undertakings of considerable importance are under contract in the neighboring municipalities. Maisonneuve, of course, takes the precedence, the figures for the first three months being as follows:

Estimated value of permits for January	$40,000
Estimated value of permits for February	225,000
Estimated value of permits for March	100,000

This record is much larger than last year's operations

Among the larger buildings projected for this summer are the following:

United Shoe Machinery Company, factory, $195,000; die factory for Mr. J. Dupre, $25,000; Shawinigan Water & Power Company's power house, $60,000; General Post Office, estimated value, $60,000; Viauville Catholic School, value $55,000; residences in connection with above school, $80,000.

The town of Verdun since the beginning of the year has issued ten permits representing buildings worth $25,000.

Montreal West, since the beginning of the year has issued eight permits to the value of $26,000.

The city of Westmount building operations have been held up since last fall as the result of an agitation for the amendment of the building by-law. The points in dispute were settled recently and the by-law as amended came into force on April 5th. It is expected that during the month of April permits for a heavy summer work will be issued under the new regulations. A large number of plans are in the office of the building inspector anad much material is already on the ground, so that just as soon as the plans can be made to conform with the present restrictions the permits will be issued and work will go on.

In the town of Outremont, which is of a residential character, similar to Westmount, there will be the usual amount of home construction, but no buildings of large value.

In addition to the buildings under way in Montreal, the Yorkshire Building, which has just been completed, should be mentioned. This is a ten-storey structure, fireproof throughout, and is to be devoted to office purposes. The floor area of each flat being rather smaller than most big office buildings the interior will be specially suitable for persons requiring suites of offices taking in a whole floor.

Work has just been commenced on the demolition of the buildings that at present occupy the site of the new transportation building.

Splendid progress is being made with the Windsor station extension, the stonework of the front elevation being up about one-third of the height and the steelwork practically all in place.

The foundations are in for the Y. M. C. A. headquarters and the superstructure will be rushed ahead now that fine weather has set in.

The excavation work for the new art gallery is under way.

Labor Conditions at Montreal

In labor circles the opinion seems to be general that there will be plenty of men on hand for the work that is in sight this season. Day laborers are now getting from 17 to 20 cents an hour, 20 cents being the scale paid by the city on municipal work. It is considered that this will be as high as the contractors will be able to pay. Masons are getting 45 cents an hour under an agreement which has two years to run, and bricklayers 50 cents an hour, under an agreement which has one more year. Plasterers' wages are not yet settled. They are asking for 54 cents and an eight-hour day, but the demand has not yet been acceded to. Carpenters are working on the open shop system and are receiving on an average 30 cents an hour, the best men getting 35 cents. It is expected that carpenters' wages will be slightly increased in July. Painters are asking for a minimum of 30 cents an hour but the employers do not recognize any minimum wage and propose to pay men what they are worth. Plumbers and electricians are paid on a sliding scale and no serious change is expected.

Calgary, Alta.—Richard Harrison, Building Inspector, writes: "The outlook for the season's work is most promising. Several modern steel structures and reinforced concrete office buildings are to be erected, besides banks and government buildings. During the past three months there have been erected 350 residences, ranging in value from $3,000 to $20,000 each. If these is no unexpected scarcity of building material this will be a record year." There was record breaking activity last month and the permits for March, 1911, exceed in value those of March, 1910, by nearly $600,000. The union carpenters have submitted their proposed agreement to the contractors. The clauses of this agreement call for double time on holidays, a 5-cent increase (making the wage 55 cents an hour) anad closed shop. The contractors are firmly opposed to the last named proviso and as there are a large number of non-union men in the city, it is probable that open shop will continue. The estimates foreshadow a large increase in the expenditure of the city, and altogether 1911 gives every promise of being a banner year.

Winnipeg, Man.—Building Inspector Rodgers, reporting to the Contract Record, states that the outlook for the season is particularly good and that there is no cause for alarm at the apparent falling off for the first quarter. The explanation is that building is starting later this year than last, and that last year permits were taken out early for several very large buildings which were not started until well on into the summer. Mr. Rodgers still holds to his opinion that the exceptional record of last year when total permits went over fifteen millions, will be beaten before 1911 has passed. Inquiries at the offices of the architects reveal numerous plans for large commercial structures, while there is every indication, already, of there being more activity in residential work than last year. April has been a most active month in Winnipeg building circles and the city undoubtedly will show much better returns than are submitted for March. It is too early as yet to make any predictions in regard to labor. The supply market generally is at normal level.

Regina, Sask.—O. T. Falls, Building Inspector, writes: "Conditions and prospects were never better. Contracts have already been awarded for a number of public buildings and business blocks, and a great deal of new work is under consideration. The Bank of Ottawa has obtained a permit for an office building to cost $50,000 and plans are being prepared for new buildings for the Imperial Bank and the Bank of Commerce. Smith Bros. & Wilson have the contract for the new Baptist Church, which is to be erected at a cost of $65,000. The contract for the Methodist College (architects, Brown & Vallance, Montreal) will be awarded in a few days."

Regina, Sask.—R. J. Burdett, Secretary, Board of Trade, writes: "Trade conditions generally are the best ever experienced and from all appearances they will continue so throughout the whole season. 1911 will witness marked development in all lines of industry. The municipal improvements contemplated are extensive. They include the construction of the electric street railway, additional street paving, boulevarding, extension of waterworks and sewerage, disposal works, Broad street subway, etc. Building and civic construction combined will involve an expenditure of $4,000,000 this season and give employment to 5,000 men. Contractors obtained an early start this year and excavations are in progress all over the city. In some instances foundations are being put in, while in a few cases the structures are slowly rising above the ground. Labor is already becoming scarce and contractors are complaining of their inability to secure enough men for their present requirements."

Victoria, B.C.—W. W. Northcott, Building Inspector, writes: "Building conditions and prospects are good; indeed, they have never looked better in any previous year."—The month of April so far has been distinguished by increased activity in local buliding circles. Permits for a large number of business buildings will be issued this month, and with a steady demand for good class dwellings, further improvement may be looked for. Of the public work projected may be mentioned the extension of the Parliament Buildings, for which Mr. Ridgeway Wilson, of this city, is the architect. At an early date the ratepayers will be called upon to vote on a by-law authorizing the raising of the sum of $290,000 for sewer construction, and in addition $50,000 for surface drains.

Edmonton, Alta.—The City Building Inspector writes: "The city's prospects are exceedingly good. The present year will undoubtedly record a great increase over previous seasons." Not only the building permits, but also the custom returns, bank clearings, post office, and street railway show gratifying increases for the first quarter of 1911. The continued expansion of trade has rendered necessary grealy increased facilities for handling business. The Ames-Holden, McCready Company are to build on Third street, and the Great West Saddlery Company and Nicholson & Bain on Seventh street. These will all be heavy modern structures rendered necessary by phenomenal increase in volume of business. Work has been commenced on a six-storey building of thoroughly modern fireproof construction on First street, for use as a departmental store. Arrangements have recently been concluded under which P. Burns & Company will at once commence the construction of a modern meat packing plant, representing an ultimate investment approximating a million dollars.

Hamilton, Ont.—John Anderson, Building Inspector, writes: "Prospects are very good and conditions satisfactory in every department of trade. We are looking forward to an excellent building year."

Ottawa, Ont.—The late spring and a shortage in certain lines of building material are given as the chief causes of the dullness in the building trades. Contractors' operations have been hampered recently by a scarcity of brick.

New Westminster, B.C.—Building is active in the Royal City and is expected to approximate $2,000,000 in value during 1911. Between new buildings, the enormous amount of civic work under way, railway construction in the immediate district, including the British Columbia Electric and Canadian Northern operations, and other enterprises, it is doubtful if there is a busier city in Canada for its size today than New Westminster. Among the projected work may be mentioned the Westminster Trust building on Columbia street, which will cost $12,000.

Woodstock, Ont.—John Morrison, City Clerk, writes: "The building permits for 1911 look better than for years. Owing to the industrial boom which set in last year a number of extensions to our present factories are projected, while new buildings are in sight. The congregation of Chalmers Church are putting up a new building at a cost of from $35,000 to $40,000. Contracts have already been awarded for a number of residences."

Moose Jaw, Sask.—W. F. Heal, City Clerk, writes: "Building operations generally are a month later than last year, but the erection of a large number of buildings this season is definitely assured and prospects are very bright."

London, Ont.—Arthur E. Nutter, City Architect, writes: "Our record this year, although not as good, so far, as that of 1910, shows improvement, and there is every prospect that the amount of building in 1911 will surpass that of previous years. The largest undertakings in hand at present were carried over from last year and the figures, of course, are not credited to this season's work."

Sydney, N.S.—D. McD. Campbell, City Engineer, writes: "Many buildings are projected for 1911 and a record season is looked for. The apparently small activity is attributable to a cold winter and a somewhat backward spring. The figures for Sydney do not include large additions made by the Dominion Iron & Steel Company, Limited."

Kingston, Ont.—H. B. R. Craig, City Engineer, writes: "Building prospects for the season are fair."

Fort William, Ont.—S. Macnamara, City Building Inspector, writes: "The season is opening up in good shape after a hard, tight winter, and I anticipate a good building year for Fort William."

Lethbridge, Alta.—H. W. Meech, Building Inspector, writes: "The decrease noted here is attributable to a slight disagreement which took place between the Trades and Labor Council and the Builders' Exchange, which greatly retarded building operations, owing to the possibility of a strike. It now looks as if matters will adjust themselves and I have no doubt that we shall have a record year."

St. Thomas, Ont.—J. P. Freek, Building Inspector, writes: "The building total has fallen away owing to a backward spring, but prospects are fairly good for the balance of the year. St. Thomas is very prosperous, with a moderate increase in both building and population from year to year."

Stratford, Ont.—Hugh Durkin, Building Inspector, writes: "Conditions are satisfactory and prospects generally good. It is probable that there will be increased activity in residential work this summer."

Halifax, N.S.—City Engineer Doane writes: "The prospects for the year are not bright. Building operations have fallen off during the last eighteen months and it is unlikely that there will be any marked revival in the near future. Among the new buildings contemplated are an addition to St. Mary's College, a large curling rink, a structure to be erected by the Freemasons, a city market building, a bank building for the Merchants Bank of Canada and an Infants' Home. The Intercolonial Railway propose to erect an 800-foot terminal freight shed and terminal piers with the necessary buildings. It is also reported that the C.P.R. will erect a large hotel in Halifax, this year, but so far it is rumor only."

Chilliwack, B.C.—A number of substantial business blocks will be erected here this season, which promises to exceed all former years in building activity. The Merchants Bank, Bank of Montreal and the Bank of Commerce have plans for new buildings and a new city hall is also among the projects. Municipal work will be heavy and will probably include a complete sewerage system.

North Vancouver, B.C.—Thos. Shepherd, City Clerk, writes: "Great activity prevails in building circles, and municipal development is proceeding apace. The Bank of British North America and the Royal Bank will shortly commence the erection of permanent buildings, while the city has extensive work in hand, including miles of sewers and permanent water mains. A building inspector has just been appointed by the council, and a by-law to establish fire limits is now being considered by that body. I regret that we have no statistics for 1910."

Saskatoon, Sask.—The city is expending over a million dollars this season on municipal improvements which include the installation of a filtration plant (to cost $55,000) and a new intercepting sewer (to cost $300,000). The two subways to be constructed at 19th and 23rd streets will represent an expenditure of $95,000, while the new light and power station will cost $50,000. An active season is assured building and contracting interests.

Five sub-contractors who have been doing railway work in the United States have been brought to Edmonton by Jas. O'Connor, to take contracts on the main line west of the Canadian Northern Railway west of the McLeod river

Methods of Sewer Construction at Regina

Description of the Manufacture of the Meriwether Reinforced Concrete Pipe—Remarks Relative to Tamping and Waterproofing of Concrete

By W. R. Harris*

The city of Regina is situated on the Wascana Creek, and has a population of 23,000. It has grown very rapidly, so rapidly, indeed, that in constructing a modern sewerage system it was necessary to build on a larger scale than is usually done.

One novel feature of this system is that it is paid for mainly by revenue derived from land owned by the city that was granted to it at the time it was chartered. About one-half million dollars will be spent for the construction of the complete sewerage system.

Wascana Creek is now polluted by the Regina sewage and the prevalence of typhoid fever may be accounted for by the fact that many dairymen water their cows from this stream. The operation of the proposed sewer system will eliminate this trouble.

The work now under construction is known as the Seventh Avenue sewer, consisting of 10,761 feet 30-in. sanitary sewer, and 2,369 feet 66-in. and 8,392 feet 72-in. storm water sewer. At Campbell street the 72-in. storm sewer makes an abrupt turn, emptying into Wascana Creek, a distance of 3,240 feet above the sewage disposal plant now being constructed. At this turn a junction is formed between the 30-in. sanitary sewer and a 48-in. main running 3,248 feet to the sewage disposal plant. The proposed sewer is known as the Wascana Valley Trunk Sewer anad joins the 48-in. main above referred to by passing the 45-in. Valley sewer under the 72-in. storm water sewer.

This is accomplished by a very ingenious type of construction, designed by Mr. John Marshall, a member of our society.

The Seventh avenue trunk sewer is being constructed with concrete pipe manufactured by the Lock Joint Pipe Company, under the Meriweather patents. This pipe is cast in sections in steel molds, and is reinforced with the triangular wire mesh sold by the American Steel and Wire Company. The joints are of the bell and spigot type, but do not project beyond the outside of pipe, and the pipe, when jointed, appears as a monolithic tube of uniform thickness. When the pipes are joined the metal in the spigot end overlaps the metal in the bell end and the mortar in the joint seals and locks the pipe.

Sealing is usually done by troweling mortar in the invert of the joint space up as far as the spring line of the arch, then after placing a spring steel sealing form, a thin mortar or grout is run into the remaining arch joint space by pouring through a hole, knocked in the bell at the top of the pipe. This hole is not broken in the bell until the pipe is placed in final position in the trench.

Now, speaking of the question of manufacture of this pipe, which will, probably, appeal to you, as contractors and engineers, more than other details, I will say that the design of the pipe is such that it can be varied, so far as reinforcement is concerned, to meet the requirements of any special job by increasing or decreasing the size of the reinforcement.

At the beginning of this work it was found that the aggregates had never been inspected or analyzed. We cast a few pipes, and noticing that the color was bad, we went into the question of the proportion of the aggregates and found that from one pit we got a poor sand, containing 25 per cent. of small gravel and 75 per cent. of sand, including a large percentage of silt. We secured from another part of the country a cleaner sand, but the proportion of the sand was greater than it should be.

I will give you the results of the tests made: The Lumsden sand, which we decided to use finally, contained 50 per cent. of fine sand and 50 per cent. of gravel. This sand, after screening, contained 36 to 38 per cent. of voids, and the gravel 38 to 40 per cent. of voids, while the bank sand and gravel had 29 to 30 per cent. of voids. By using one part of Lumsden sand and two parts of Lumsden gravel we reduced the voids to 26.8 per cent., and we determined to screen sufficient gravel to obtain the proper aggregate, which was used with the residue, thereby increasing the gravel in the aggregate.

Another matter that gave us trouble is that the Canadian cement bag is much smaller than the American bag. An American contractor would consider that the sack contained approximately 9-10 of a cubic foot of cement, where as it holds only 75-100 of a cubic foot, with the average a little higher on a series of tests.

It was after we made these tests that the city had other tests made, and as a result immediately issued orders for all work in town to stop until the matter could be looked into further. After that every contractor had to screen his sand to get better work. The sidewalk and building construction had been very poor, probably due to the fact that the contractors had not gone into the question of proper mixtures and proper materials. They may have been perfectly honest in their intentions to give a good job, but seldom gave it. It is in such things as this that our society can be of assistance to our members by letting them know that such things should be examined and looked into, and by recommending ways and means to avoid these troubles. No contractor wants to do bad work, and no one wants to have his money held up owing to faults resulting from the use of poorly graded materials or improper mixtures of concrete.

This is getting away from the subject I began with, but it is to let you all know the troubles that we have had there.

Now, to return to pipe construction. We use ordinarily a 1-2-4 mixture of concrete, and after the concrete is made very wet, i.e., "sloppy," it is placed in molds and churned, and cut by means of a hoe with a straight shank, the blade being curved to fit the circular forms. In that way we get a finished surface against the forms. After the concrete is placed in the molds the spigot end is made. The pipe is then allowed to stand in the mold 24 hours, anad the casing stripped the following morning without removing or disturbing the pipe in any way. After three days we raise the pipe with a derrick and a lifting ring which

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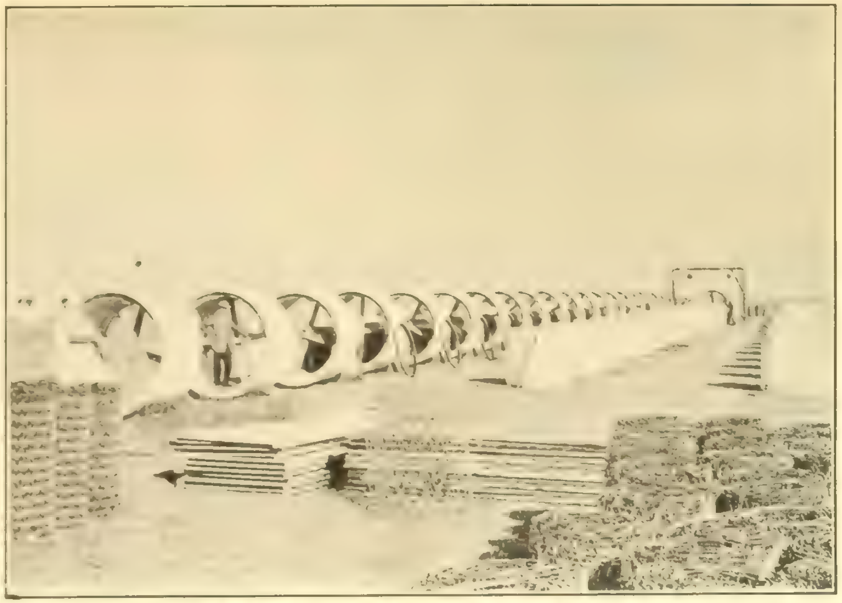
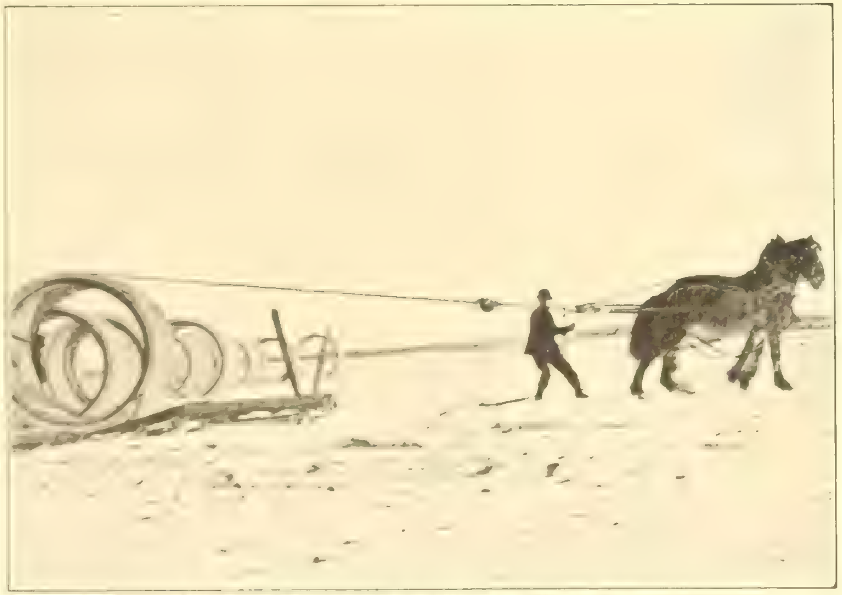
* Before the American Society of Engineering-Contractors

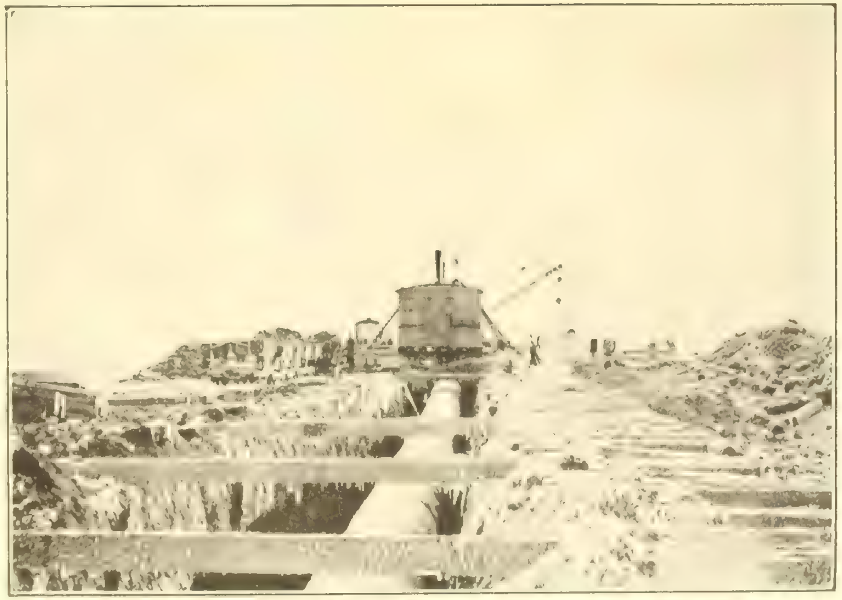


72" and 48" Pipe Manufacturing Plant

72" Junction Pipe

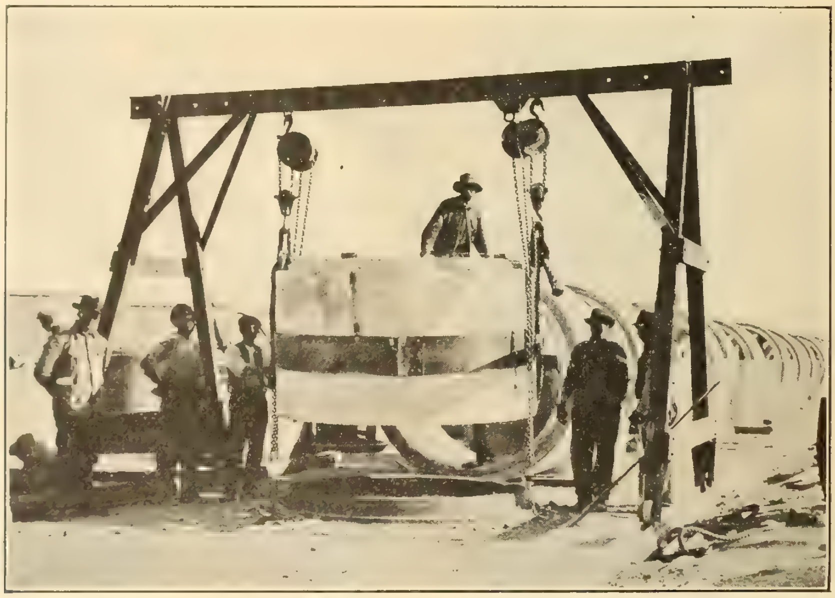


Winter Delivery of 72" Pipe Loading on Sled



Laying 48" Sanitary Main to Disposal Plant in Zero Weather we use. Each pipe is then set on its bilge, and allowed to remain thus for several days. The pipes are delivered at the place of manufacture, or at yards located along the line of the trench. At other times we have made the pipe alongside of the trench. In other words, the pipe is always delivered to the contractor on his work. The joints can be made immediately, and backfilling can be done at once, which is the plant adopted on the Regina contract.

At the beginning, sewer construction, i.e., the excavation of the trenches, was delayed, owing to the fact that the city was unable to get its steam shovel as soon as desired. The time of the arrival was so late in the season that the monolithic work or pouring of joints could not have been done. The pipe was laid with the thermometer down to six degrees below zero. Snow fell on October 30, and when I left Canada, November 30, 1910, it was ten degrees below zero. Work was stopped on the day I left because of the breakdown of the steam shovel, and was not resumed until the spring of 1911.



Lifting 72″ Pipe from Base

Discussion

Mr. Lockwood: How long was the pipe?

Mr. Harris.: The total length of pipe, including the bell. is 4 feet 3 inches, but each section of pipe laid gives a net length of 4 feet.

Mr. Lockwood: Where do you place your reinforcement.

Mr. Harris: On this particular job it was placed within the inner third, viz., 1 inch on 30-in. pipe, and 1¾ inch on the 48-in. pipe from the inner surface. The 30-in. and 48-in. pipes have one ring of American Steel and Wire Reinforcement style 34, and the 66-in. and 72-in. pipes have 2 rings of the same style of mesh, the inner ring being placed 2 inches from the interior surface and 1½ inch from the outer surface.

Mr. Lockwood: How do you hold the reinforcement in place?

Mr. Harris: By means of an annular ring in the bell casting. We also have vertical spacing strips that hold the reinforcement the proper distance from the form. These strips are pulled as the concreting progresses, and when this reaches the top the strips are out altogether. The top ring is made so that it keeps the reinforcement in place until the concrete is set. After the section of pipe are assembled the reinforcement is securely locked by mortar in the joint.

Mr. Lockwood: What strength do you aim to get in your pipe

Mr. Harris: The Lock Joint Pipe is reinforced for external pressure only, at the present time, and with a 1-2-4 mixture sufficient density is secured to prevent percolation of sewage through the walls or joints of the pipe. I made hydraulic tests of a 36-in. pipe with a four-inch wall. I tested one pipe, and with a pressure of 7 pounds forced water through the ordinary concrete mixture of 1-2-4, although the percolation was slight. I grouted that pipe on the inside and the pressure increased to 14 pounds before percolation ensued. I used a waterproof compound mixed with the cement, but was not able to get over 14 pounds pressure without leakage through the concrete wall of the pipe. I used another compound mixed with the concrete and broke the pipe before I could force the water through the concrete. The pressure obtained was 32 pounds with a 36-in. pipe, in which the reinforcement was placed to resist external pressure, and not internal pressure, as I did not expect to secure such good results that a pressure of 32 pounds could not produce leakage.

Mr. Lockwood: What depth of trench did you figure for?

Mr. Harris: The maximum depth of the trench is 30 feet at Regina.

Mr. Lockwood: Do you waterproof all this pipe?

Mr. Harris: It is not necessary.

Mr. Lockwood: Don't you have a male and a female joint?

Mr. Harris: Yes; there is a male and a female joint, so made that it forms a dove-tailed recess, and the concrete, even though there was no adhesion, would not fall out owing to the dovetail overlap.

Mr. Hanson: Mr. Harris, do you have those pipes braced?

Mr. Harris: For the first few days, because the concrete is green and under the age of three of four days it is not advisable to have the green walls unsupported. We have perpendicular and horizontal braces in the pipes.

Mr. Hanson: Do you handle them when they are three days old?

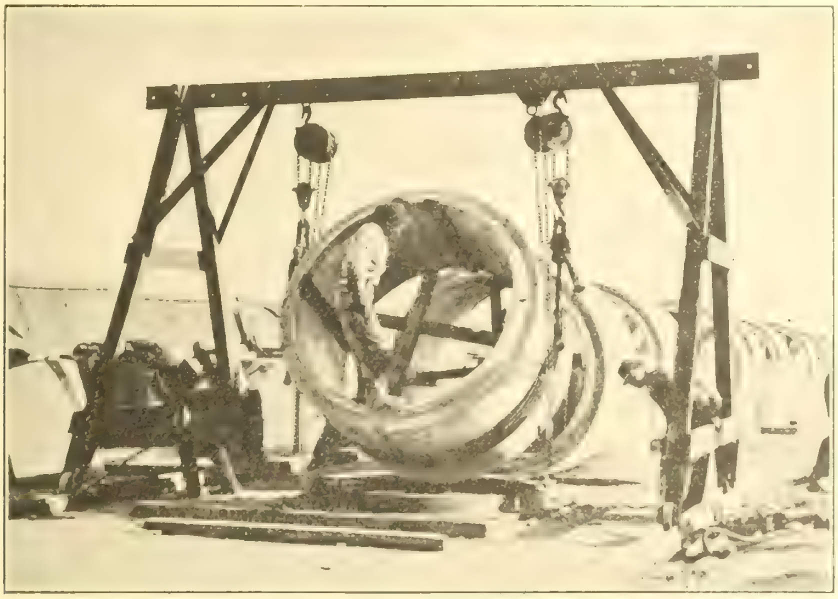
Mr. Harris: They are moved at that time, before we take them to the yard, but we would prefer to have them three weeks old before we deliver them to the trench.

Mr. Wemlinger: Can the joints be made from the inside?

Mr. Harris: They can be made from the inside or in the manner described before, by knocking a hole in the upper part of the bell four or five inches in size, and the joints made by filling the invert with ordinary mortar, using a trowel and then pouring grout through bell opening at the top.

Mr. Hauer: Can you describe how you deliver and lay the pipe

Mr. Harris: Fortunately, most of the pipe was delivered after the first snowfall, October 30, and we used sleds for that purpose. We made some bob sleds. The large pipes were rolled on to a bob sled. A rope was then fastened to the sled, which was drawn by a horse. The pipe was distributed along the trench, and all the contractor had to do was to pass his derrick hook through the pipe, lift it over the trench, lower it down and put it in position.


Moving 72" Pipe to Side of Base with Movable A-Frame Derrick

Mr. King: What do you use to prevent the freezing of your concrete?

Mr. Harris: We use wooden flumes set alongside the pipe, and one flume over the pipe, making a V-shaped covering. We place in each pipe one or two gasoline lamps or torches, according to the expected temperature overnight, and between each two pipes we place another torch. We provide an opening so that there will be a circulation of air around the pipe, and had we placed the torch into one, the air would go round; but placing them between the two we were able to heat the air which went into the pipe as well as that which came out.

Mr. Hauer: How far apart were the forms?

Mr. Harris. At first three feet; later in the season we placed them six feet apart. It was then we used the additional lamp. The forms were spaced sufficiently so that the lamps could be set between them while we were still assembling the other forms. The method of doing the work is as follows. To begin with, one row of pipes, made the previous day, is stripped of the forms, then as these forms are stripped they are assembled in another row. The reinforcement is now placed in a slot in each inside form, and sand is placed in that slot to prevent concrete flowing into it; then the outside casing is placed in position, after which the concreting is the next and last step of the day's work.

Mr King: How much lap in the reinforcement do you allow?

Mr. Harris: Six inches. The reinforcement is fastened at the lap by means of Sargent belt clamps, which are similar to the ring placed in a hog's nose. These clamps are then clinched with pliers, one being used on nearly every strand of wire. We set up the reinforcement on a mandrel and secure each strand at the lap, for the reason that we can thus assemple the wire mesh quicker than where it is set up on the base of the form before it is wired together.

Mr. Wemlinger: How large, approximately, is the saving as compared to monolithic construction?

Mr. Harris: I cannot say positively. Our experience with different contractors has proven that sometimes one contractor will figure lower on our pipe, whereas another contractor will figure much lower on the monolithic.

Ordinarily, the lock-joint pipe can be manufactured for less cost and placed in the trench for less money than monolithis, due to the fact that most monolithic pipe is heavier construction. Again, from the contractor's standpoint, there is rapidity of construction with the former as compared with the monolithic construction, which must be allowed to set before the trench can be back-filled.

There are few weather conditions that prevent the laying of the reinforced pipe.

Mr. Wemlinger: With your pipe the cost should be nearly constant for the same diameter of pipe.

Mr. Harris: The labor cost is practically constant in man-hours, but not so in dollars and cents; due to labor rates and the over head expense. Furthermore, it is never constant because of varying freight rates that influence the general expense. However, the man-hour cost per yard of concrete would be considerably less on the lock-joint pipe than on monolithic construction, because the concrete mixer can be placed closer to the pipes, unless it is placed above the trench and carried along with the work where the concrete is monolothic.

Mr. Wemlinger: Do you generally use a mixer?

Mr. Harris: Yes; where the yardage of the combined job will justify.

Mr. Wemlinger: Do you require to furnish the contractor pipe to lay in his trench

Mr. Harris: We expect to furnish it delivered on the trench.

Mr. Wemlinger: He has nothing whatever to do with the manufacture of the pipe?

Mr. Harris: No. We supply the sand, cement and the material. He lays the pipe as any other pipe, except that the breakage of clay pipe is usually at the risk of the contractor, as it is delivered f.o.b. cars. But not so with us.

Mr. Wegmann: Do you have a great percentage of breakage?

Mr. Harris: No, sir; practically no breakage. We occasionally have a few bad pipes at the beginning of a job, where the materials are not what they should be. Sometimes there is too much sand. Originally the concrete specified was 1 to 4 or 1 to 5, and there was not sufficient cement to fill the voids, and we could not get a good concrete.

Mr. Lockwood: It was too weak?

Mr. Harris: Yes, sir.

Mr. Wemlinger: What is your limit as to the size of stone?

Mr. Harris: Ordinarily three-quarters or one inch.

Mr. Wemlinger: Do you use gravel?

Mr. Harris: Either gravel or crushed stone. For instance, on a pipe having a 7-in. wall, i.e., a 6-ft. pipe, we could use a lagrer aggregate. There may be pipe ranging from 24 in. to 96 in., and we specify a one-inch aggregate.

Mr. Lockwood: Do you find any difference?

Mr. Harris: We get as good concrete with one as with the other.

Mr. Wemlinger: You have a standard of thickness for each diameter, I suppose, Mr. Harris

Mr. Harris: Yes, sir. The dimensions of each diameter of pipe are fixed as a standard. If it were not so the cost of plant would have to be included in every job.

Mr. Wemlinger: How many forms do you use?

Mr. Harris: In Regina we had forms to turn out 100 feet per day, 100 feet of 30-in. and 80 feet of 48-in. forms. Ordinarily, a large job would be figured on the basis of 100 feet or more per day. If the contractor has to rush his work the size of the plant must be increased accordingly.

We use wheelbarrows, shovels and standard tools, such casing strippers; we have also an A-frame derrick, with a chain, blocks and trolleys of sufficient size to handle the pipes.

Mr. Hauer: Is the hoisting done by hand power?

Mr. Harris: Yes.

Mr. Wemlinger: Do you make specials?

Mr..Harris: Yes, sir; we make slants or "T" inlets.

Mr. Wemlinger: Do you make bands?

Mr. Harris: We make no bands, as they are not necessary in making our joints. We have used for our intakes, pipe as large as 84 inches in diameter without bands. Pipe now being made at Perth Amboy for a subaqueous intake is in 20-ft. sections. It is to be laid in cradles on piles, and a diver connects the sections by means of cast iron flanges set in the concrete pipe and bolted together by a diver.

Mr. Hauer: Did you ever try tamping concrete with a round bar? My experience is that you can do more with a round bar, working in a slanting or rounded form, as you have with your pipe, than you could with a straight bar.

Mr. Harris: I have tried using a slash bar, having a face on it of about one inch.

Mr. Hauer: That is too large.

Mr. Harris: We are using hoes with straight and long shanks and the blades curved to suit the form.

Mr. Hauer: I have used a one-half inch or five-eights inch bar with a right angle bend four or five inches long, and found that this cuts the concrete and you do not have the suction with the bar tha tyou have with the side of the hoe.

Mr. Harris: We never used such a tool.

Mr. Hauer: I think you would find it of advantage. A number of contractors find it better than the hoe.

Mr. Harris: You mean simply a bar, with the ends turned off at an angle of 90 degrees?

Mr. Hauer: Yes; it is very light, and the workman will do more work with it.

Mr. Wemlinger: Does that catch in the reinforcement?

Mr. Hauer: It would in some types of reinforcement, but not in the wire mesh of which Mr. Harris speaks. I have put up 3-in. walls with reinforcing in it, very successfully with those bars, and then I have used them on 3-ft. and 4-ft. thick walls, and especially on the face, and I got splendid results.

Mr. Harris: Do you find that these bars eliminate the air-holes?

Tamping with Round Bars

Mr. Hauer: Yes, sir. When you use a spade or a hoe you open up a large gap which permits the air to enter and stay in the cement, which does serious harm; while with a bar, the right-angle piece is always below the surface, and when it is drawn no air can collect.

In building small walls I had three or four men tamping with heavy tamps—about two by four. I then took off one or two men and gave them round bars, and they did more work than the others. It is like handling a heavy ram. The workman picks it up anad then he lets it fall, and before he picks it up again he looks around awhile; with the round bar, on the other hand, being light, he will look around while he is working with it.

About seven years ago I found a large contracting firm making a specialty of reinforcing concrete, using these bars, and I did not begin to use them immediately. Although I used such a bar on one job, I paid no special attention to its work. Then I tried the old way again and made comparison of the two, and the more I have used the bar the more convinced I am that it is an economical thing to give you good concrete.

Mr. Lockwood: I do not tamp. I use a very wet concrete.

Mr. Hauer: If the wall is 6 in. or more in thickness you can; but take 3 or a 4-in. wall, even though you may take concrete so wet that it will run and pour it in that space, there will be air-holes in it.

Mr. Lockwood: It is a question of head or height and not thickness.

Mr. Hauer: You cannot throw concrete from any considerable height into these narrow forms.

Mr. Lockwood: I thought it could not be done, but I learned that it could.

Mr. Hauer: I find the concrete when very wet flushes from side to side, and dropping in 14 ft. slushed the boards. That was the trouble with a reinforced tank that I built. We bid $1,800 or $2,000 for this little reservoir and allowed $200 for waterproofing; instead of that it cost us $2,000 to waterproof it. The first four feet of concrete was so poor that it looked like a sieve. After trying several waterproofing mixtures or compounds without satisfactory results, we built a 3-in. brick lining, leaving 2 in. of space between the brick and the concrete, which was filled with grout, and we had no further trouble with the waterproofing. It leaked very little and whatever leakage took place must have come through the bottom itself.

Mr. Lockwood: Any waterproofing I have tried needs to be put on as quick as you can strip your forms. I usually take five pounds of potassium alum—not ammonia alum—one pound of concentrated lye; mix that with a gallon of water; then take one pound and a half of this solution and mix it with ten pounds of cement, and water to make it like whitewash. This is then put on after adding enough sand to make a three-to-one mixture, and rub it until it lathers. If it don't lather, it won't do the business. I put this lather on a wall 3,800 feet long with 30 feet of water back of it.

Mr. Hauer: What about waterproofing pipe of this style, and especially pipe having to sustain internal pressure?

Mr. Harris: I think we could safely guarantee to make a pipe that will sustain 20 pounds pressure, but I do not think at the present time we could guarantee service for higher pressure. I believe that later we shall be able to make pipes that will resist a higher head. We can make our concrete as strong as we want by using heavier reinforcement; but we want to fill the pores of the concrete with something that will close them and not injure the concrete. By grouting the pipe I was able to go up to 20 pounds pressure.

I did not mention the waterproofing process where I got 30 pounds pressure, as I am not sure the final results will be altogether right. In other words, I am not sure what effect the process has on the strength of the concrete. That is the main point. If we are using waterproofing that will cause the concrete to lose strength in course of time, we of course do not want it.

Mr. Hauer: Do you think this pipe could be used for water supply?

Mr. Harris: It could be for main conduits, but not for house service connection.

There is another thing to consider in a pipe joint; i.e., the effect of placing the new mortar or joint compound against old concrete. If the shrinkage is only 1-1,000th of an inch, water will find its way through the crack at certain pressures. We do not know at the present time how tight we can make our joint. We are experimenting to make them water tight against high pressures.

Effect of Oil on Concrete

Mr. Simth: I understand that accidentally a barrel of oil burst in the cement storehouse of the Agricultural Department, and it was found that when mixed with the cement it made a splendid waterproof concrete. Since then they have experimented with it, with the result that they have used oil instead of water with the concrete there.

Mr. Harris: What was the nature of the oil?

Mr. Smith: I do not know. I gathered these facts from an official report which did not give this information.

Mr. Harris: The Louisville Cottonseed Oil Company was considering the use of concrete for tanks to hold cottonseed oil. They made test pieces and found that the concrete disintegrated when immersed in the oil. Why this happened in this case but not with the other oils I do not know.

Mr. Hauer: They are building some tanks on the Pacific coast, very large ones, taking a month or more to empty them.

Mr. Harris: I do not know what there is in cottonseed oil that should break down concrete any more than linseed or machine oils would. I have yet to find an engine room floor where the oil will disintegrate the concrete.

Mr. Hauer: In excessive quantities oil is supposed to be detrimental. It is certainly excessive in these tanks out west.

Mr. Smith: But the concrete from which these tanks are made is mixed with water instead of oil. It merely holds the oil.

Mr. Harris: I know of an experience a cement company had about cement not setting. The contractor complained that the cement was poor, and the cement people took samples, but could not find out what the trouble was. They were on the job one morning and found that the contractor was greasing the inside of his mixers to prevent the cement sticking.

Mr. Wemlinger: What was the oil used?

Mr. Harris: Linseed. There was some mineral oil in it.

Mr. Lockwood: I use North Carolina tar and Rosendale cement as a mixture, and as far as I know it is absolutely water-tight. I use that on sewer pipe joints.

Mr. Smith: If you mix that tar with any other cement wouldn't it make water-tight joints?

Mr. Lockwood: If you mix it with Portland cement you cannot get the same results.

Mr. Hauer: Do you mix sand with it

Mr. Lockwood: No; just the Rosendale cement and tar. This North Carolina tar is peculiar. You must take a shovel and dig it out of the barrel. It does not get brittle.

Mr. Lockwood: What size mesh do you use?

Mr. Harris: We use a 4-in. mesh. The cross wires are spaced on 2 and 4-in. centres, and the longitudinal strands spaced on 4-in. centres.

Mr. Hanson: Do you have any trouble with the specifications? I remember a job on which I was working where the inspector rejected all pipe with airholes. Is that customary, Mr. Harris?

Mr. Harris: No, sir; that is not customary. We have found specifications that require tests under which monolithic work could not be constructed. We are willing to guarantee the same quality and strength as on any form of concrete construction, but we are not in favor of making concrete pipes to stand tests more severe than required for monolithic structure. One engineer stated to me that "I would have allowed your pipe in the specifications, but I have fixed them so that you cannot bid." (Laughter.)

Mr. Lockwood: Why did you settle on 4 feet as the length of your pipe?

Mr. Harris: We have some larger pipe, made in Havana, that is only 3 feet long. That is used in deep trenches. We can make the 4-foot section almost as quickly as we can make the 3-foot section, and the contractor can lay it as quickly.

Mr. Lockwood: How about an 8-foot section?

Mr. Harris: A 4-foot section is about the maximum height which a man can make conveniently standing on the ground. If we went over that height we would have to construct runways, which would run up the manufacturing cost. All of our molds are now made to be filled by hand.

Foreign Labor Organizing

Mr. John A. Flett, general organizer of the American Federation of Labor, has begun the systematic organization of Italians, Hungarian, Polish and other foreign labor in Canada. A meeting for taking the initial action in this movement was held in Montreal on April 16 when several hundred workmen signed a petition asking for a charter. Further meetings for completing the organization will follow, and the organizers expect to meet with entire success. There are said to be about 1,200 Italian workmen in the Montreal colony alone. Mr. Flett stated that Italians had not been getting fair wages in the past but had been taken advantage of by labor agents in all branches of work. They would now have regular officers and a scale of wages corresponding with the different departments of work in which they were engaged. Considerable interest exists on the labor market, and before any forecast can be made it will remain to be seen what scale of wages will be adopted.

At Fort William the C. P. R. has built a bridge over the Kaministiquia river. It is a Strauss-Bascule, double track, double deck bridge, the ground level being for railway purposes and the upper deck for vehicular traffic. The movable span is 186 feet in length and the approaches measure about 70 feet of construction work at each end. The contractors for the steel work were the Canada Foundry Company, of Toronto, and the substructure was built by A. C. Stewart, of Winnipeg. At McKellar the C. P. R. has erected a double track railway bridge with highway space on one side on the same level. The bridge is of the Strauss type of Bascule bridge. The movable span is [illegible] feet long. The masonry work of this bridge was constructed by A. C. Stewart, of Winnipeg, and the steel work by the Canada Foundry Company, Toronto.

Sprinkler Tank Supports*

The last of a very interesting series of technical papers read before the Architects' Association of Quebec, at Montreal, was on the subject: "Notes on sprinkler tank supports." This paper was prepared and read by Mr. Marcel Beullac, C.E., B.Sc., special lecturer on structural engineering at McGill University.

Mr. Beullac introduced his subject by remarking that, curious as it might seem, the curtailment of the title of his paper by dropping the first two words in the announcement had considerably enlarged its scope. He, however, would confine himself to the original topic.

The lecturer eliminated sprinkler towers built separate from buildings and carrying sprinkler tanks only, which were engineering structures generally, outside the field of architecture.

The construction of a sprinkler tank involved the problem of keeping the water from freezing and he described the different methods for doing this, one being to house the tanks and another to heat the water either by introducing steam coils inside the tank at the bottom, or by means of a steam jet below the surface of the water.

Taking up the subject of the loads that would have to rest on the supports Mr. Beullac mentioned three points for consideration:

(1) The dead load of the tank and support.
(2) The live load of the water in the tank.
(3) Wind pressure.

An important item to be reckoned with was the amount of moisture that would be absorbed by different kinds of wood that might be employed in the construction of tanks. He showed that the increase in weight of wet woods over dry woods was from 20 to 40 per cent.

In designing supports for sprinkler tanks it was necessary to consider the real and not the nominal capacity of the tank. On account of the wind-load being considered, the snow-load was usually neglected.

Mr. Beullac then explained how the load bore on the joists in relation to the dead load, water and wind. Photographs showed the effects of these on joists and supports, one effect being a tilting or slanting, either on steel or wood, and the other the crippling of steel supports.

Speaking of bracing, Mr. Beullac declared it to be his opinion that angle-sway braces were safer than rods with turnbuckles.

Mr. Beullac showed drawings of batter towers. These were supported by inclined posts strengthened by struts and sway braces. He did not see that these had many advantages over the vertical tower. There was little danger, he said, of both tanks and supports tipping as a result of wind pressure when a tank was full. If the tank were empty when struck by a strong wind it might tip. It had occasionally been found that tanks supposed to be full of water were quite empty, this condition of affairs being due to the fact that the indicator got caught at a point where it showed the tank to be full so that it failed to go down with the water, the true condition of affairs only being found through casual inspection. This showed the necessity for frequent and careful inspection. The wind pressure on a tank house was greater than that on the tank itself owing to the shape and greater bulk of the tank house. Tank houses are sometimes braced against the floor of the tank. Several photographs were shown to illustrate the different styles of tanks, tank houses, supports, anad foundations to be found in Montreal.

Speaking of tanks constructed on old buildings, Mr. Beullac declared that at best they were simply a make-shift and he expressed the hope that the committee now engaged in forming a new building by-law for the city of Montreal would see to it that the construction of sprinkler tank supports be regulated anad that in future no sprinkler tank supports be placed on buildings not designed for this purpose and that sprinkler tank supports on old buildings be carried by new structures built from the ground up.

The fact that sprinkler tanks would be with us for a while yet—probably until a high pressure system for fire protection is installed—made it absolutely necessary that the supports should be constructed with a view to perfect safety; and tanks could be made safe. Tanks to be seen on buildings, speaking from the artistic viewpoint, were positive eye-sores. He was pleased to say that some tanks had been enclosed by towers which completely hid the tanks and at the same time added architectural value to the buildings. The Lyman and Birks buildings were examples in point. In the Birks building provision was made for a fireproof stairway to be used as a fire escape in connection with the walls supporting the sprinkler tanks.

An Interesting Discussion

At the conclusion of the paper a vote of thanks was moved by Mr. A. C. Hutchison and seconded by Mr. Arthur Amos, after which a discussion took place, when many opinions and suggestions were advanced.

To make sprinkler tanks safe it was asserted a little more money would have to be spent by proprietors and less leniency must be shown by architects, but the path of safety should be insisted upon, and in the end it would pay. The serious accidents that had occurred in Montreal had been traced to insufficient supports and defective walls. Some walls that appeared to be well built, so far as the outward indications went, were found, on being pierced, to be hollow, due to skimping on the part of irresponsible workmen or negligent contractors who were in a hurry to get through with their job at a profit, their tender having been too low to enable them to do good work.

A point not touched in the paper was brought out during the discussion, and referred to the question of vibration. An instance was given of a seven-storey building where the vibration affected shelving on the top storey to the extent of a quarter of an inch. This was most noticeable in the front of the building, but there was a sprinkler tank on the rear of the building which was constantly being affected to some extent by the vibration. It was contended that no large tanks should be erected on old walls, for no architect living could tell on sight what the inside of a wall was like. Tank supports should be constructed by conscientious and capable contractors. The calculations were complicated and should not be left partly to the guess work and partly to the bad arithmetic of junior clerks, draughtmen, or contractors.

According to one speaker there are few really safe sprinkler tanks in Montreal. Three-legged tank supports were almost always unsafe. Among the causes contributing to accidents were mentioned the bursting of staves and hoops, the giving way of joists, the buckling and corroding of steelwork, and the miscalculation regarding certain forces which under special circumstances should be taken into account.

As an alternative to the sprinkler system one speaker mentioned a double water pressure connection from the street which it was stated would secure equally favorable insurance rates. Still another suggestion was the installation of a water pressure tank in the basement.

"Tankophobia" was the name suggested for the agitation in favor of the sprinkler system and the many questions growing out of it. There were many other problems of equal importance being dealt with every day by architects in connection with plans calling for weight-carrying and stress-resisting walls and other supports. The practice some people were indulging in, of adding third and fourth and fifth, anad even more storeys, to buildings originally intended to be two storeys in height, was equally dangerous. This was particularly the case when different architects and different contractors were employed in carrying up the additional storeys. It was feared that some day Montreal would be shocked by a heavy casualty list resulting from the collapse of such a structure. The only safe fire-escape for industrial establishments in the opinion of one speaker was the independent fireproof stairway.

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* [illegible] by our Montreal Representative.

Mr. J. Rawson Gardiner, president of the Architects' Association, presided.

The Manufacture and Testing of Fire Brick

Composition of Fire Clay—Practical Notes on Mixing, Preparation, Moulding, Drying and Burning—General and Specific Tests

By A. V. Bleininger

With regard to the manufacture of fire brick we might consider this subject briefly from the standpoint of the mixing, preparation, molding, drying and burning.

The ideal fire clay would be a pure clay possessing sufficient, but not excessive plasticity, good working and drying qualities, low burning shrinkage and, of course, maximum refractoriness after burning. However, such a combination of qualities is difficult to find. The fire clays which are available are frequently clays of practically no plasticity and which cannot be worked alone. They show, of course, no drying shrinkage, but are often highly refractory since they correspond closely to the composition of the pure clay substance. Hence, while they are valuable on this account they are troublesome on account of their lack of working qualities and their high burning shrinkage. These clays are known as flint clays. They vary in composition and qualities from locality to locality, and, hence, the term flint clay does not necessarily mean a high grade material. These clays, when mined, are quite hard, of dense conhoidal fracture, but after long storing become sotter and show a slight increase in their working qualities. If ground very fine in a tube mill, especially in a wet condition, these clays could be made to develop sufficient plasticity to be made into bricks by the slop process.

Again, the fire clays may be clays of the so-called "set" type, which, though like flint clays in being nonplastic at first, are readily made plastic by ordinary fine grinding. The writer has seen such clays from Alabama, which could be manufactured into high-grade products since they have practically the composition of kaolin, and, hence, are exceedingly refractory.

The fire clays most frequently found are of the plastic type, but of inferior refractoriness, approaching more or less the No. 2 fibre clays in composition.

From what has been said it is quite evident that it is difficult to find a clay which in itself could constitute a good fire brick body. In most cases, therefore, we are compelled to produce a body consisting of flintclay and bond clay, mixed together in about the ratio of 6:1 for high grade products. In some cases the burning shrinkage of the flint clay is so high that part of it must be calcined or replaced by crushed old fire brick, called grog. As regards mixing the fire clay it might be said that it is of primary importance to study the formation and quality of every part of the clay deposit so that there is not the slightest doubt as to what part is of inferior or superior refractoriness. If a certain vein or streak is of low value it should be clearly recognized and rejected. On the other hand, if the low grade material is but small in quantity and cannot be plainly recognized it might be possible to render it more harmless by causing it to be mixed uniformly with the entire output of the clay mine so that the average content of the injurious clay is very low. This would mean, of course, a good-sized stock shed, which, by the way, would be an excellent investment for almost every fire brick plant.

As to the proportioning of the flint and plastic clays it might be said that this should be done by proper mechanical devices so that the desired amounts of the two clays are introduced at all times, thus resulting in a more uniform mixture. It usually is most desirable to mix the ground flint and bond clays.

Preparation of the Clay

The customary preparation of the clay mixture consists in dry pan grinding, screening and tempering in the wet pan. Where the bond clay is of good quality this treatment is amply sufficient, but where the quality of the product suffers by the use of an inferior plastic clay a different treatment might greatly improve the resultant quality of the brick. Owing to the fact that the breaking down of a fire brick is due to its least refractory constituent it is easily seen that the quality of the product may be improved by grinding the plastic clay with some of the flint clay to an intimate mixture which passes quite a fine mesh, say the 20 mesh screen. To illustrate, if a brick could be improved by grinding, say 20 per cent. of the flint with the 15 per cent. plastic to this fineness and using as the bond these 35 per cent. of mixture. The writer has succeeded in improving by this treatment a fire brick which otherwise would have beeen of low quality. There are now many grinding machines on the market which could do this kind of fine grinding very cheaply and efficiently, and this suggestion might prove of considerable value to plants now struggling with the annoying bond clay problem.

Most of our fire brick are molded by the soft mud process, either by hand or machinery, and are frequently repressed. For most work this kind of brick is probably the best, though for certain purposes such as gas benches, etc., where the brick are subjected to the effects of high temperature and pressure the dry press process is to be preferred.

The drying offers, as a rule, no difficulty, however, and need not be considered in this connection. As regards the burning it might be said that the temperature should be carried as high as possible.

It is a well known fact that the burning shrinkage of a clay does not reach its limit with the first burning, but that some additional shrinkage takes place on re-burning, though in decreasing amounts. Although we are not able to burn fire brick so that no further shrinkage whatever takes place on heating, yet we should endeavor to carry the burning as far as possible. Underburnt fire brick are very undesirable for many purposes and the burning temperature should in no case be below cone 12. The idea that soft burned fire brick are as good as the harder burned is erroneous.

As to the testing of fire brick the subject might be considered under the heads of general and special tests. The former involve the conditions of refractoriness, chemical analysis and load carrying ability. The latter depend upon the use to which the brick are to be subjected, involving the action of slag or glass, abrasion by ore; action of caustic lime at a red heat or any of other numerous factors.

Summarizing again the general tests for No. 1 fire brick it might be said that the brick should not soften below cone 32, should be as low in fluxes as possible, not over 0.20 RO expressed in chemical equivalents and should be able to carry a load of 50 lbs. per square inch at 1,350 degs. C., as practiced in the test used by the Bureau of Standards.

There are as yet no general requirements establishing clearly what properties constitute a No. 1 fire brick and how it differs from the No. 2 material, and the writer would suggest to the manufacturers of fire brick that it might be well to co-operate in setting down certain definitions along these lines, though naturally it is impossible to cover every case of the use of fire brick. This suggestion is made with the idea of benefiting primarily the manufacturer who, in many cases, is not receiving the equivalent of the value of his products and of putting a premium on quality. High grade brick should be paid for according to their quality.

This question is an important one as may be seen from the current articles in the metallurgical journals, in which the question of refractories is constantly brought up. If any specifications are to be drawn up as is being demanded by the metallurgical engineers, let the movement start from the side of the manufacturers in order to avoid the danger of unjust demands on the part of the users which would work harm to the fire brick industry.

Railway Companies' Marathon to the Coast

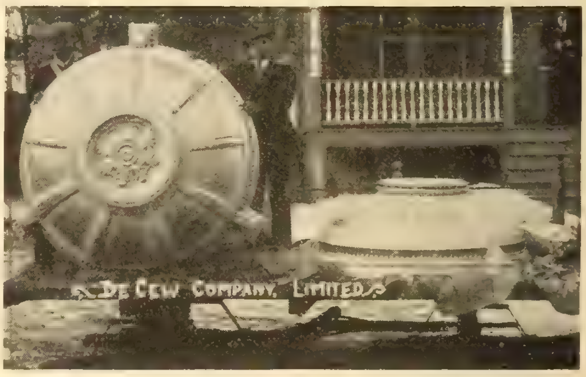
The Grand Trunk Pacific and the Canadian Northern are each striving to make the first connection with tidewater on the Pacific. Two years ago the Grand Trunk Pacific and the Canadian Northern were battling for primary location of route through Yellowhead Pass in the Rockies. The Grand Trunk Pacific won out, but the year following the Canadian Northern beat the Grand Trunk to it for a location or route down the North Thompson river into Vancouver. With the Canadian Northern building its line to Vancouver via the North Thompson, and the Grand Trunk Pacific heading for its terminals at Prince Rupert via Fort George, both railways are plunged into a keen race for the first completed grade through to the Pacific. West of Edmonton, which is the base of this race, the Grand Trunk Pacific has 200 miles of grade completed, while the Canadian Northern has only 40. From the Pacific end, the Grand Trunk Pacific has 150 miles of grade completed to the Canadian Northern's 70. For the past two year the Canadian Northern has not been doing much grading on its main line west of Edmonton. With the Grand Trunk Pacific rails laid within a few miles of its proposed route, almost parallel for the whole distance west of the mountains, and with the advantage of being able to ship in supplies and outfits by rail right to the very doors of the construction camps, the Canadian Northern will concentrate its greatest construction efforts of the undertaking of rushing its main line through. The Canadian Northern will also undertake to complete, ready for the steel, exclusive of the bridges, 400 miles of main line grade every year until its line is completed to the Pacific coast. The Grand Trunk Pacific is building its lines in 100 mile stretches, while the Canadian Northern is building its in 200 mile stretches, building 200 miles from each end of the line. With the completion of the 200 miles contract west of Edmonton, the line will reach the Athabasca river in the mountains, while the 200 mile contract out of Vancouver will carry the line to Kamloops. With the completion of the 400 miles next year, this will bring the two ends of the line within about 300 miles of each other, and in the next year, which will be 1914, the whole line should be finished whereby the east should be connected with the west by the Canadian Northern Railway.

Indirect Illumination in the West

Though the first installation is not yet a year old, indirect lighting has already secured a firm hold in the west. R. G. Dunn and Company were the first to secure an installation and others followed in rapid succession until at present there are over 250 installations in Winnipeg and many farther west. The system has taken hold strongly with architects and owners so that many of the new buildings now under construction have specified either indirect lighting throughout or with direct lighting only where it is desired for the decorative effect.

It is significant that the G. T. P. have specified this system for the whole of their western offices and depots wherever electrical energy is available. They have awarded the contract for all of their work to the DeCew Company, Limited, and many of the installations have already been completed.

The two large Methodist churches just completed have also put in the indirect lighting system, and efficiency tests have shown that it is most economical. Of these Young Church is probably most worthy of mention. The total installation is 7,740 watts, the greater part of which is carried in four large special fixtures, built according to a design accepted by the architect and church board. These are 5 ft. 4 in., outside diameter, and weigh 275 pounds each. Each fixture carries 15 tungsten lamps of 100 watts each, giving a candle-power of 1200. A smaller fixture in the organ loft carries 600 watts and under the galleries there are ten others carrying a total of 1140 volts. The main fixtures are carried on heavy bronze chains and are a material addition to the general design of the interior. While the source of light being hidden gives the impression that it is not adequate, it is found by experience that it is much more effective than a direct system using the same amount of current, in that it casts no shadows and is most perfectly diffused.



Indirect Lighting Fixtures for the Young Methodist Church, Winnipeg.

One of the advantages of the indirect system is that fixtures of any desired design may be readily built. The fixture is first modeled in clay, then a mould is made and the finished product is made from a special composition which may be poured the same as plaster of Paris, except that it is capable of taking a better finish. Any desired finish may be given in iron, bronze or gold to suit the scheme of decoration. Completed, the fixture weighs less than the old style of brass fixture of equal candle power.

In addition to the manufacture of these fixtures the DeCew Company has also started a department of plaster modelling and is prepared to undertake work of all kinds in this department. In the past, architects have to a large extent neglected plaster for interior decoration, chiefly because it was necessary for them to send out of the city for it.

East and West -- Montreal and Vancouver

Activity in General Building and Municipal Work—Noteworthy Prospects – Steel Plant for Vancouver—The Labor Situation at Montreal

Correspondence of the CONTRACT RECORD.

Vancouver, B.C., April 19, 1911.

If it were not for the uncertain state of the weather here building operations would now be in full swing. Vancouver has no special building season so far as temperature goes, but the downfall of rain every other day or so during the winter and spring causes temporary breaks in outside work, which, however, are not sufficiently serious to affect the trade materially, as may be gathered by Vancouver's position at the head of the list of twenty-six leading cities of the Dominion, for the first quarter of 1911. Vancouver's progress just now is one continuous record of improvement. Of the February total of $4,051,958 for twenty-three Canadian cities Vancouver's share was $1,047,730—more than one-fourth.

Large financial concerns are buying up available property or land upon which is located old rickety buildings, and modern office buildings, stores and apartment houses are being erected rapidly. Eastward from Cambie street to Main street there are very few building sites not covered by substantial structures.

Excavations are in progress on five splendid building sites between Main street westward on Carroll—the dividing street line of the east and west ends of the city. Large stores and offices are planned.

Messrs. Allan Bros., of Pender street, have purchased a site at the corner of Main street and Seventh avenue, where they will erect a large business block, tenders for which will be called almost immediately.

A seven storey steel-concrete building will be erected at the corner of Broadway anad Main street by Mr. Lee. Excavations have been completed but the work has been delayed for steel which will arrive from England via the Horn. A great deal of building is going on in this district which is one of the busiest parts of the city, inasmuch as the car lines at the junction of Main street and Broadway reach all suburban points.

Le Mesurier & Company have purchased a site on Richards street, near Georgia street, upon which they will erect a large business block. Messrs. Springer Bros. will erect 100 dwellings, mostly of the bungalow type, ranging in cost from $1,400 to $2,800. These houses will help somewhat to meet the large demand for such structures all over the city. An apartment house to cost $18,000 will be erected by R. Y. Blackhall at 1137 Burrard street, and a residence costing $12,500 by Mr. Hector Stewart on Triumph street.

Among the notewarthy projects under consideration may be mentioned the proposed steel works, which will probably cost $1,000,000. Mr. W. Owen, the steel expert, has returned from England and is selecting sites for the erection of the new plant. He told our representative that he was unable as yet to go into details but said that all the capital required for the undertaking had been secured; and further, that deals have practically been closed for the purchase of iron areas in the province.

A trainload of electric generating machinery arrived on March 31 from the east for the Western Canada Power Company. Contracts were awarded recently for the construction of a $200,000 power house and $100,000 receiving station, and for the erection of the first of the big steel towers for the power transmission line. The location of the works is at the Stave river falls, near Ruskin, B.C., [illegible] miles northeast from Vancouver. Over 500 men were put to work in various capacities, the wages paid being more than $40,000 a month, exclusive of supplies. The next three months will be marked by increased activity as the $3,000,000 plant approaches completion. This company will supply light and power for this city.

To date $4,260,451.85 has been passed for local improvement work, and eighteen months' work is in sight. The city's portion is $1,462,560, and the property owners' $2,797,891.85. These figures are given out by City Controller Baldwin.

Vancouver and North Vancouver jointly will spend $27,150 improving and widening the Capilano (pipe line) road. This picturesque highway will have a uniform width of 66 feet for about seven miles.

North Vancouver

Along the North Vancouver waterfront, on Burrard Inlet, wharves and warehouses are gradually making their appearance. Whilst progress in this ilne of building does not seem so prominent as the construction of residences and blocks through the residential and business sections of the city, yet it is most commendable that waterfront industries are creeping into existence at the rate they are, considering that there is no railway communication outside the city. This latter lack of a public utility is expected to be but short-lived, for negotiations are so far advanced for the building of a joint traffic and railway bridge at the Second Narrows that it can be said with assurance that it is only a matter of months until active operations will be commenced.

A Clear Horizon at Montreal

Office of the Contract Record,
Montreal, April 24, 1911.

The number of permits issued by the City Building Inspector for the month of April up to the 19th was 224. Most of these were for new work. The estimated value of new buildings was $721,960, and of alterations, $68,305, a total of $790,265.

As the result of numerous conferences between the labor leaders and building employers, the difficulties that appeared to be looking up at the beginning of the season have been smoothed over, so that at the present time no labor troubles are anticipated. The plasterers have signed a new agreement for a scale of 42½ cents an hour, to take effect after July 1st. The present wage is 40 cents. After November 1st the eight-hour day will come into effect, and on January 1, 1912, effect will be given to the union scale of 45 cents an hour. A committee of arbitration representing both employers and employees has been organized to settle any difficulties that may arise in this branch of labor.

It is declared on behalf of the employing carpenters that they will not acknowledge the union scale. First-class carpenters may get this wage, but contractors will not sign any agreement recognizing this as a fixed rate of remuneration. Just what the outcome will be cannot be definitely stated, but no trouble is anticipated.

It is stated that the city of Winnipeg is about to advertise for a manager for the new municipal power plant at Point du Bois, now nearing completion.

Canadian Contractors and their Work

Two of the Best Known in the Western Field: Peter Lyall, Jr., and J. D. McArthur—How They Achieved Their Success

Peter Lyall, Jr.—Montreal, Winnipeg and Regina—three Canadian cities, each with a world-wide reputation—have offices of the firm of Peter Lyall & Sons. This is the growth of a single concern in thirty-five years, a firm of contractors which has undertaken and carried through some of the largest work in the country. Peter Lyall, Sr., born in Caithness in 1842, came to Canada a young man, imbued with a determination to succeed. It is needless to follow the various steps which finally brought him into prominence, but in 1875 the firm which bears his name was organized. Together with his three sons, all trained in various branches of the building trade, he has carried the firm half way across the continent.

Peter Lyall, Jr., Winnipeg, Man.

The senior member of the firm is not so well known in Winnipeg as his son, Peter, Jr., who for several years past has been in charge of the work in the west. Among their notable achievements may be mentioned the C .P. R. depot and Union depot, at Winnipeg, and the new parliament buildings of the province of Saskatchewan at Regina.

The first contract secured in the west was the C. P. R. depot, then one of the largest pieces of work attempted in Winnipeg. The difficulties which had to be overcome were tremendous. For instance, the railway company desired that native stone should be used and at the same time there were no cutting yards big enough to undertake the work, nor was it possible to secure a large enough gang of hand-cutters to deliver it within the specified time. The contractors put in a mechanical cutting plant with diamond saws, gangs, and planers. The hand-cutters went on strike as a protest against the introduction of machinery, but the strike was broken by the importing of a couple of carloads of cutters from Quebec. A steel erecting gang went on strike and a gang of foreign laborers were broken in to do the work. But the finished contract was turned over on time. And so it has always been with other works undertaken: a Lyall contract is a fact, not a proposition.

The branching out of this company into various fields has, to a certain extent, been forced upon them. Before they entered the field, the greater part of the large dimension cut-stone was imported, with the result that but little of it was used. East of Winnipeg there is a good deposit of limestone, but the owners did not have sufficient capital to handle it. Peter Lyall, Sr., furnished the capital and the firm to-day are operating it. At the quarry they have installed one of the largest cutting plants in Canada, with every modern facility. The stone for the Parliament Buildings at Regina was furnished from there, as well as that for the Winnipeg Union Depot.

Peter Lyall, Jr., is now just in his prime—a keen sportsman and an all-round favorite. He is surrounded by a staff of loyal, competent men, and the firm is in a position to undertake work of any magnitude. The western branch is prosperous; in fact it is whispered that it will be but a short time before the western end of the business surpasses the eastern in importance.

J. D. McArthur.—After 31 years in the Canadian west, to have arrived at the head of one's profession, is a feat to boast of; and if at the same time one can point to great works accomplished, that in itself provides a sufficient monument.

Builders are what is wanted in Canada, and it is worthy of note that Canada itself has provided some of the most notable of the men who have striven to bring Canada to the fore.

Probably no part of Canada has furnished more noted contractors, men who have accomplished great things and left their mark on the transportation systems of our country—than Glengarry. J. D. McArthur, railroad builder and lumberman, is one of these. Born on a farm in Glengarry, Ont., on June 25, 1854, he was one of those young men who first received the call of the west, where he arrived at the age of twenty-five years. Equipped with perfect health, indomitable energy and a public school education, it was

J. D. McArthur, Winnipeg, Man.

but a short time before he found his way into railroad work, then one of the biggest problems of this new land. His first work was with a "flying gang" on the C. P. R., where his duties consisted of being ever ready for a rush order to any part of the system where there was trouble, wreck, breakdown or land-slide.

At that time but little capital was required if one wished to get into construction work, and a very short time found J. D. in charge of a piece of new work. As the main line was carried west he was always ahead of the steel, finishing up with a piece of heavy rock work on the eastern slope of the Rockies. Then there were many branch lines to be built and these served to keep his outfit busy, year after year. There was one piece of work, put through a few years ago, which gave him a record among railway builders. A section of 500 miles of a C. N. R. line called for a rush order; Mr. McArthur received the contract and in nine months the grade was ready for steel.

Immediately following this came the contract for section "F" of the Transcontinental railway, a piece of road which cost $13,000,000 to build, and which is one of the finest sections of roadbed in Canada—if not on the continent. It was a monumental task to put that line through within a specified time, but it was done, and done properly, and to-day the greater part of it rides like a piece of old roadbed, though for miles it runs through muskeg country, which is considered one of the greatest obstacles of the railroad builder.

It must not be imagined for a moment that these thirty-one years were periods of constant sunshine. They were not. In fact there were times when a confirmed optimist would have had trouble in finding a ray of sunshine; and it was only those with pluck and endurance, who at the same time commanded the respect of their backers, who pulled through. Like many other contractors whose work was on prairie sections, Mr. McArthur carried a heavy outfit of teams, and during dry years oats and hay were almost prohibitive, so that idle teams would eat their heads off during the winter. To keep them busy he went into the lumber business, where spring freshets, snowless winters and a hung-up log drive sometimes spelled a bad season.

But that time is now past, and were it not for his restless energy Mr. McArthur could retire very comfortably from active work—something, by the way, which he does not propose to do. A year ago he invested a portion of his money in the construction of the largest and most commanding office building in Winnipeg, and he has also entered largely into the lumber business in British Columbia. Land and other interests take up the balance of his attention.

Personal Mention

Mr. J. G. Rossman, of New York, has been appointed manager of the new civic power plant, Winnipeg.

Mr. J. P. Napier, of Victoria, B.C., has been appointed assistant engineer in the department of public works for British Columbia.

Mr. Geo. D. Mackie, of the John Galt Engineering Company, Winnipeg, was in Ponoka, Alta., recently, taking levels preparatory to street grading.

Mr. J. N. Stone, manager of the Dominion Bank at Windsor, Ont., has been appointed secretary-treasurer of the Bishop Construction Company, Montreal and Toronto.

Messrs. Hayden & Skean, of Calgary, Alta., were the successful contractors for the erection of the Swiss village, which the C. P. R. is establishing in the Rockies.

Mr. Peter Lyall, Jr., Winnipeg, is identified with an English syndicate which proposes to erect a 14-storey building on Main street, Winnipeg. Plans for the structure have been recommended to the city council for acceptance.

At Edmonton, Alta., last week, Mr. Lionel Gibbs delivered an address on Civic Planning before the St. George's Society. Mr. Gibbs advised the city to prepare for the time when it would have a population of 500,000.

Mr. Charles Macdonald, who was recently appointed to fill the vacancy on the Quebec Bridge Commission caused by the resignation of Mr. FitzMaurice, was born at Gananoque, Ont., on January 26, 1837. He received his early education at the old Kingston Grammar School and later at the Polytechnic Institute at Troy, N.Y., from which he graduated as a civil engineer in 1857.

His professional career commenced under the late Mr. Samuel Keefer, C.E., on the survey of the Grand Trunk Railway. Later he took up residence in New York, joining the Union Bridge Company, of which he became head. As an engineer he devoted himself chiefly to the design and construction of railway bridges, of which may be mentioneed the bridge across the Hudson river at Poughkeepsie, N.Y., and the Hawkesbury river bridge, New South Wales, Australia. This latter bridge is remarkable on account of the depth of the foundations.

Mr. Charles Macdonald of Gananoque, Ont.

In 1894 the degree of LL.D. was conferred upon Mr. Macdonald by Queen's University. He is commodore of the Gananoque Yacht Club and is interested in all kinds of sport.

Mr. John G. Glassco, formerly with the Dominion Power & Transmission Company, at Hamilton, Ont., has been appointed Electrical Superintendent of the Winnipeg municipal electric station at Point du Bois. For the past two years Mr. Glassco has been with the construction staff of Smith, Kerry & Chace, of Winnipeg and Toronto.

Mr. F. C. Gamble, formerly Chief Public Works Engineer and Inspector of Dykes for the Government of British Columbia, has been appointed Deputy Minister of Railways of that province. Mr. Gamble is succeeded as Public Works Engineer by his former assistant, Mr. J. E. Griffith.

Mr. R. J. Lecky, of Regina, who, up to the present time, has been manager in that city for Peter Lyall & Sons, was the successful tenderer for the Methodist College in [illegible] for which Messrs. Brown & Vallance, Montreal, are the architects. The contract price is $268,780, which sum is for the erection of the first section, only, of the college buildings. Mr. Lecky has had charge of the Parliament Buildings contract at Regina, involving an expenditure of one and a half million dollars.

Mr. [illegible] H. Peters has been appointed Commissioner of Irrigation, vice Mr. John Stewart resigned. Mr. Peters will be called upon to supervise many important projects in western Canada, including the extensive work now being carried on by the Canadian Pacific Railway.

Mr. N. J. Ker, city engineer of Ottawa, returned last week to the Federal Capital after spending four days in Preston, Berlin, Galt and Toronto. Incidentally, Mr .Ker spent part of the time with City Engineer Rust, of Toronto, who was also taking a short holiday. During his trip Mr. Ker inspected the bacteria beds, septic tanks and sewage disposal system in Berlin.

Canadian City Engineers

Allan Waters, Nanaimo, B. C.

Mr. Allan Waters, City Engineer of Nanaimo, B.C., was born in the county of Essex, England, in 1868, and was educated at the Collegiate School, Tunbridge Wells, Kent. On leaving school was articled to Mr. S. W. Haughton, M.S.A., architect and surveyor. Upon the completion of his articles he entered the office of a London architect and district surveyor. Later, in architectural offices in Derby and Manchester, he obtained extended experience on the erection of large business blocks and ecclesiastical buildings. Mr. Waters left the Midlands for South Wales upon his appointment as assistant surveyor to the Barry and Codoxton local boards, afterwards entering the offices of the Metropolitan Board of Works of London (now defunct) where he was engaged chiefly on main sewer extensions.

City Engineer Waters, of Nanaimo, B. C.

In 1893 Mr. Waters received an appointment on the staff of the Director of Works of the Admiralty, being appointed to the Devenport Naval Yard under E. Colson, Esq., C.B., an eminent dock and harbor engineer who designed the large Alexandra dock at Malta and the Dover harbor, among a number of other noteworthy works. During this period Mr. Waters was engaged on plans for new shipbuilding slips, machinery shops, extensive additions to the Naval Engineering College and dock construction work. In 1896 he received from the Admiralty the appointment of Officer-in-Charge-of-Works at the Halifax, N.S., Naval Yard, where his work consisted chiefly in the extension of wharves and miscellaneous construction and maintenance. The duties at Halifax also included an annual inspection of Admiralty properties in Newfoundland and down the coasts of Nova Scotia and New Brunswick. The Commander-in-Chief on this station was Admiral Lord Fisher.

Mr. Waters returned to England in 1899. After a short period at the Admiralty head office in London he was sent out to the Island of Ascension on the west coast of Africa, immediately before the outbreak of the Boer war, as engineer-in-charge of various works of fortification, water supply and new buildings. Upon the completion of this construction he returned to England and received a gratuity as a recognition of his able services.

Upon the termination of the Boer war, Mr. Waters left the Admiralty and went to the northern Transvaal to join three brothers who had served through the campaign. There he obtained further valuable experience. Among his various commissions were the preparation of reports on irrigation schemes promoted by the mining companies of the Rand and several important works of building construction. Later, he accepted an engagement with Mr. D. Leitch, engineer of the Johannesburg municipality and formerly an Assistant Director of Works at the Admiralty. After a short period in the sewerage department of the Johannesburg engineering department Mr. Waters was placed in charge of the construction of tramway and general traffic subways under the railways.

In 1906 Mr. Waters left the Transvaal for Australia. Obtaining an appointment with the Ferro-Concrete Company, of Australia, he went to Auckland, N.Z., where the company had extensive contracts from the Harbor Board for the reconstruction of the whole of the large wharves and docks, in reinforced concrete. The Ferro-Concrete Company also built for the Auckland city council a ferro-concrete bridge with the longest single span arch in existence, the span being 300 feet with a rise of 87 feet and the total length of the bridge being 950 feet.' The general system of reinforcing employed by the company is the Hennebique with plain bars.

Upon the completion of the above contracts Mr. Waters accepted a position with the city engineer of Auckland. In this capacity he designed and supervised the construction of a reinforced concrete service reservoir of three million gallons capacity, also street improvement works entailing heavy reinforced concrete retaining walls. Two of the outer walls of the reservoir were constructed on the street lines in the city.

Mr. Waters' varied experience of the world and of the engineering profession prompted him to turn to the possibilities of the Canadian field, and in 1909 he left New Zealand for British Columbia. After a short period in the Provincial Lands Department of Victoria he was appointed engineer to the city of Nanaimo. During Mr. Waters' regime extensive municipal improvements have been undertaken. A sewerage scheme has been designed and is now well in hand, nine miles of concrete sidewalks have been laid, and the water supply has been considerably extended, the work including a concrete dam impounding 14,000,000 gallons of water.

Constructional News and Notes

News of a noteworthy western building project comes from Edmonton, Alta., where the G. T. P. have decided to erect a modern hotel at a cost of something like $750,000.

Tenders closed last week for the installation of a mechanical filtration plant at Saskatoon, Sask. It is hoped to have the plant in operation by December 1st next.

A Welland dispatch records the completion of the new bridge which the Michigan Central Railway have erected over the Welland Canal at a cost of $200,000.

Seventeen million dollars will be spent by the Grand Trunk Pacific during 1911 in constructing new lines and erecting station buildings throughout the west. There will be 619 miles of work undertaken on the branch lines and completed during the present season.

Mr. J. K. Cornwall, M.L.A., the pioneer of the northland, has obtained permission to pave part of an Edmonton street with asphalt, which he will freight up Athabasca river from Fort McMurray, and pack in by Indians. The experiment is to demonstrate the asphalt resources of the north, which Mr. Cornwall says will supply all Canada's needs.

An investigation by the fire department of Montreal, of the fire escapes in factories there, revealed a startling condition of affairs. In many cases the equipment was either totally inadequate or hopelessly antiquated. In one factory, where a large number of girls was employed, the only access to the solitary fire escape was a barred window, which took ten minutes to open.

It is reported that the new Montreal jail under construction at Bordeaux is expected to be ready for occupation next February. The institution is hexagonal in design, but only four wings are being completed at the present time. They will have a capacity of 600 prisoners. Mr. Pauze, the contractor, will receive orders next week to proceed with the erection of the guard wall, and it is expected that two more wings will be built as speedily as possible.

Strikes and rumors of strikes are in the air at Vancouver, B.C. A number of carpenters are on strike for a wage of $4.50 a day. They have been receiving $4 a day and the Builders' Association offers $4.25. The unions as usual are busy making tall threats. The employers declare that unless their terms are accepted they will declare open shop, and import men from the United States and the Old Country.

Alterations are nearly completed for the new Freeman hotel, formerly the Carsley department store, facing on St. James and Notre Dame streets, Montreal. This building now contains about 150 rooms in the upper storeys besides dining rooms, sitting rooms, and the usual accommodation provided in a house of public entertainment. The alterations have been made under the supervision of Messrs. Finley & Spence, architects. Mr. C. E. Deakin is the contractor.

A somewhat curious action is being brought against the Canadian Northern Railway by the widow of a workman named Brouillette, who is suing to recover $8,000 damages for the loss of her husband. Brouillette was employed upon bridge work at Quebec and was killed by a fall alleged by the plaintiff to have resulted directly from strain induced by over work. The evidence showed that the man had worked continuously for 27 hours. It is claimed that the company is responsible for his death for allowing this.

The fire and light committee of Toronto will recommend a graded schedule of rates which builders will pay for the inspection and supervision of their operations. Inspection of property over $1,000 and not more than $2,000 will cost $2.00; over $2,000 and not more than $3,000, $2.75; over $3,000 and not more than $,000, $5.00; over $5,000 and not mor ethan $10,000, $8.75; over $10,000 and not more than $25,00, $15.75; over $25,000 and not more than $50,000, $25.75; over $50,000 and not more than $100,000, $45.75.

Thos. Kelly & Sons, of Winnipeg, it is rumored, are the successful contractors for the dormitory building of the new Agricultural College at St. Vital, Man. At the time of writing no definite award has been made owing to the absence of the Provincial Architect, Mr. Samuel Hooper. The plans for the proposed building provide for a total of 500 rooms.

The proposed extension of the Royal Alexandra Hotel at Winnipeg, by the addition of from two to four storeys, is delayed owing to a division of opinion as to the ability of the the foundations to carry the extra strain. A number of architects and experts were called in to examine the footings, but their reports varied considerably. It is possible that the question will be referred to the president of the road, Sir Thomas Shaughnessy.

Among the visitors to Montreal last week were Mr. J. S. Irvin (Ottawa), of the Canada Cement Company, and Mr. J. H. Plummer, president of the Dominion Steel Corporation.

The carpenters of Calgary, Alta., are asking for an increase from 50 to 55 cents an hour, with 65 cents for foremen, after July 1st. The plasterers and hod carriers are also out for a raise. The former want 75 cents an hour and the latter 50 cents, instead of the present rate of 68 and 45¾ cents respectively. The stone-cutters have obtained a wage of 65 cents an hour and the plumbers 57½ cents.

The British Columbia Mental Hospital, a view of which is shown herewith is said to be one of the finest of its kind in existence. It is situated at Mount Coquitlam, New Westminster district. The hospital will consist of seven buildings in all, which will total in cost to $1,000,000. During the year 1911, $400,000 will be spent upon the buildings, farm and grounds. The work on the foundation for the main building has been completed. It is expected that it will be ready for occupancy in the spring of 1912.

A cement syndicate, headed by Mr. Allan Haines, of Spokane, has been formed at Edmonton, Alta. An excellent property has been secured a few miles west of Edson, on the G. T. P. The company, it is stated, will install a plant with a capacity of 1,000 barrels and will deliver cement in the city at $3 a barrel. Mr. F. J. Klossoski, an expert engineer from the other side, has been engaged to report on the project.

Contract Bonds

Editor, Contract Record:

In your issue of the 5th inst. I am made to say that the bonding company received timely notice of the collapse of the bridge and refused to pay up. What I did state was just the reverse, the company claimed that notice of default had not been served upon them in the allotted time, as prescribed by the policy, and refused payment accordingly. The government legal department confirmed this, although the news of the disaster was telegraphed all over the world as soon as it occurred. My point was that a corporation is liable to take advantage of any legal technicality—being another case of "insurance that does not insure."

Under the heading "Contract Bonds" you say that a Toronto office wrote bonds covering $3,766,717.26 for a premium consideration of $47,115.95. This at once dispels the quarter of one per cent. delusion. According to my rekoning the amount [illegible] about one and [illegible] quarter per cent. which would make [illegible] into a builder's [illegible]

Yours truly,
"Building Contractor."

Trade Notes and Business Notices

Architects and builders will be interested in the decision of the Yale and Towne Manufacturing Company, of New York, to establish a Canadian plant at St. Catharines, Ont. A site has been secured and the erection of the buildings will be commenced immediately. It is hoped to have the new plant in operation early in 1912. The business of the Canadian plant will be conducted by a subsidiary company, "Canadian Yale & Towne, Limited." Meantime, Canadian requirements will be catered to from the general offices at 9 Murray street, New York. The company's plant is at Stamford, Conn. "Yale" products, made in Canada by Canadian labor, should appeal to the trade more strongly than ever.

Escher Wyss & Company

On account of the steadily increasing development of their business in Canada, the Escher Wyss Company decided to open a Canadian office and to make Toronto its Canadian headquarters. This firm is world-known as a pioneer in the field of hydraulic engineering and has gained its reputation in this country by its various installations at Niagara Falls, where large water turbines have been supplied for the Canadian Niagara Power Company, the Shawinigan Water Power Company, Montreal, and also for the Niagara Falls Power Company, etc.

The Escher Wyss Company was founded as early as 1807, and started the manufacturing of water turbines in the year 1840, in the time of the Jonval and Girrard turbines. Hence the make of the above firm has become world-known and at the present moment its name is connected with important water power plants all over the world.

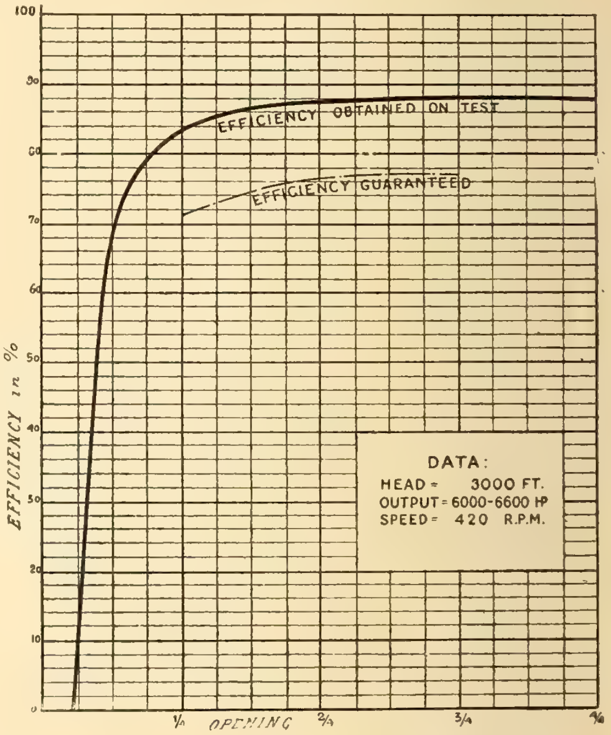
Since 1890, the demand for turbines of the Escher Wyss Company's make has increased rapidly, and at the moment of writing the firm possesses the record of having supplied 5,000 turbines representing a total output of not less than 2,000,000 horse power and of having on order by March, 1911, water turbines representing an output of 400,000 horse power. Of the most important plants on order may be mentioned:

Two 13,000 h.p. turbines for the Western Canada Power Company, Vancouver.
Six 10,000 h.p. turbines for Messrs. S. Pearson & Son's successors, Mexico.
Six 12,000 h.p. turbines for the Kinugawa Hydro-Electric Supply Company, Toyko, Japan.
Four 4,600 h.p. turbines for the Sao Paulo Power Co.
Four 5,000 h.p. turbines for the German Swiss Water Power Company, Bales, etc.

In 1905 the vast works in Zurich, Switzerland, were enlarged to about twice the previous size and are now fitted with entirely new and up-to-date machinery—equipment which enables the company to comply with any desire of its customers so far as first-class design and prompt delivery are concerned. The figure stated above—400,000 horse power on order will give the reader some idea of the efficiency of this renowned Swiss concern.

Apart from the general design and construction of high and low pressure turbines, the Escher Wyss Company is well known, especially in Canadian engineering circles, for its exquisite design of turbine governor which has lately been improved considerably and which is now able to solve the most complicated governing problems. The company has supplied approximately an equal number of high pressure turbines or impulse wheels (the pressure ranging from 150 to 3,100 feet) and of Francis turbines, the pressure ranging from 1 to 650 feet. As the company considered the design of the Francis turbine practically to have reached perfection, the daring problems connected with the exploitation of the highest heads have received the company's closest attention. Two years ago the Escher Wyss Company got an order for the whole of the hydro-mechanical portion of the Adamello power plant, Northern Italy, where a head of about 3,100 feet has been utilized, the total capacity of the plant being 20,000 h.p. Apart form the pipe line, which had to be designed with the minutest care, the construction of the turbine was thoroughly entered into and no cost saved in order to turn out a first-class piece of workmanship. This plant was started during January last and proved entirely satisfactory. The efficiency obtained on official test reached a height never approached before, which may be gathered from the accompanying diagram, 88 per cent., this figure remaining practically constant for 4/4, 3/4 and 2/4 load.

Each turbine has an output of 6,600 h.p., is of the impulse wheel type, and has been fitted with automatically acting deflection the nozzle of the Escher Wyss & Company's special patent design. The high efficiency obtained is due to the careful design in general and to the construction of the buckets and nozzles in particular. A complete description of this plant will appear in a later issue.



The Canadian office, in Toronto, is supposed to deal with business in Canada, United States and eventually Mexico—where lately vast water power plants have been put in use. The manager of the Canadian office is Mr. Thv. Heyerdahl, chief engineer of the company, who arrived from London, Eng., quite recently, having had charge of the London office of the above concern for the last two years.

Engineers, architects and builders will find much of practical interest and value in the Blue Book of the Pittsburg Steel Products Company, which has been prepared with a view to assisting the design of concrete structures in accordance with sound theory and the best practice, and without laborious mathematical computations. All tables have been prepared using formulae recommended by "A Joint Committee on Concrete," of the American Society of Civil Engineers, American Society for Testing Materials, American Railway Engineering and Maintenance of Way

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Contracts Department

News of Special Interest to Contractors, Engineers, Manufacturers and Dealers in Building Supplies.

Information for insertion in these columns is invited from Architects, Contractors, Engineers, etc.

Waterworks, Sewerage and Roadways

Brandon, Man.

In the matter of street paving the following prices were decided on for crushed stone to contractors: for Nos. 2 and 3 stone, $2.25 a yard; for No. 1, $4 a yard, in so far as the city can supply this material. The basis of the paving is to be properly screened gravel.

Edmonton, Alta.

The time for receiving tenders for construction of trunk sewer has been extended until May 15th. A. J. Latornell, city engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Estevan, Sask.

It is now definitely decided that a plant for the manufacture of sewer pipe will be established here soon, and the promoters of the enterprise are figuring on having the main building completed by November. The company building the plant is composed of eastern capitalists, and the estimated cost is about $150,000. F. L. Tennent, is in charge.

Kingston, Ont.

The city of Kingston are about to call for tenders for the laying of about 10,000 square yards of permanent pavement. H. B. R. Craig, city engineer.

Moncton, N.B.

Tenders addressed to J. S. Magee, city clerk, will be received until May 1st for construction of concrete walks here. Plans, etc., at office of the city engineer or office of the above.

Montreal, Que.

Tenders addressed to the Board of Commissioners, will be received until May 1st for supply of the following machinery: 6 concrete mixers, side loaders, capacity 1-2 cu. yd., to be operated by steam or electric motor; 6 concrete mixers, side loaders, capacity 3-4 cu. yd., to be operated by steam or electric motor; 1 five-ton asphalt steam roller; 24 hand concrete carts; 12 concrete spreaders; 30 asphalt waggons, under dump; 1 portable asphalt machine; 1 or more portable crushers, with screen and bins, to be operated by steam or electricity, direct current. L. N. Senecal, secretary.

New Westminster, B.C.

The Burnaby ratepayers endorsed the three by-laws calling for an expenditure of $850,000. The largest was $50,000 for roads, and the balance of $350,000 for a water system. The by-law asking for the permission of the people to conclude an agreement with the city of Vancouver to supply the municipality with 250 in. of water at an annual cost of $7,000 was also endorsed.

Messrs. Cleveland & Cameron, a firm of engineers, were appointed to supervise the construction of the water system for Burnaby. They will be required to prepare a geographical survey and take all levels necessary to construct the system. This is to be handed to the council within a month. They will supervise the work while the system is being constructed.

North Battleford, Sask.

The ratepayers voted to issue $38,000 bonds for waterworks and sewer extensions from plans of Chipman & Power, of Toronto, Ont. S. Cookson, secretary-treasurer.

Quebec, Que.

The city will expend $350,000 on street improvements. W. Ballairge, city engineer.

Saskatoon, Sask.

The commissioner's report on the tenders for the intercepting sewer were as follows: labor, McGougan, of Port Arthur, $127,000; reinforced concrete sewer pipe, The Lock Joint Pipe Company, of New York, $137,000; cast iron pipe, the Gartshore Thompson Pipe Company, Hamilton, $13,481.

Simcoe, Ont.

Tenders are called until May 15th for construction of five miles of concrete sidewalks and crossings. J. W. Sanders, town clerk. Advertisement in "Tenders and For Sale Department" of this issue.

Smith's Falls, Ont.

Tenders for brass goods, lead pipe and fittings necessary for house services for season of 1911 addressed to J. A. Lewis, town clerk, will be received until May 1st. Information with Town Engineer.

Stettler, Alta.

The council contemplate grading and improving streets and sidewalks.

South Vancouver, B.C.

The municipal council decided that they would call for tenders to take a topographical survey of South Vancouver and have a contour made of the municipality preparatory to the construction of the local section of the big comprehensive sewer system which is now being discussed between the city and the municipalities interested. The council will specify in the contract that the work has to be completed within three months after the first of May.

Stratford, Ont.

In the report on Romeo Creek drainage scheme the following is the approximate cost: concrete culvert, 2,300 cubic yards at $7, $16,100; backfilling, $2,000; 10 manholes at $50, $500; 12,972 ft. of tile, excavation, laying, etc., 60c., $7,732.20; 40 catch basins at $12, $480; preparing plans, assessment, etc., $1,000; extras, $1,000; total, $28,863.20. City Engineer, M. Ferguson.

Vancouver, B.C.

City Engineer Clement reported that the cost of a rock crushing plant on the reserve opposite Barnet would be about $33,500. This estimate would provide for an equipment capable of turning out 350 cubic yards daily and covered not only the cost of the crushing machinery but all the necessary conveyors, motors, compressors, drills, bunkers, cart hoists, air receivers, etc.

Victoria, B.C.

The extensions to the sewer system to cover the section at present without drainage will call for an expenditure of about $290,000; drain extensions, about $50,000.

The Columbia Bitulithic Company offered to lay the surface coat on Seventh avenue from Bridge to Scotia at $1.77 per square yard, guaranteeing the work for five years (accepted). Superintendent Scott stated that the price was based on the estimate furnished the engineer last year, $1.55 per yard being then quoted for paving material in the wagons at the company's plant. The extra 22 cents per yard was said to cover the hauling, spreading and rolling of the coat. The engineer was directed to call for tenders for bitulithic paving on Twelfth avenue.

Tenders addressed to Wm. W. Northcott, purchasing agent, will be received until April 28th for the following: 350 4-inch double gate valves; 100 6-inch double gate valves; 10 12-inch double gate valves; 15 tons best blue pig lead.

Waterloo, Ont.

New tenders for the construction of cement walks for 1911 will be called. Specifications for such were submitted by Engineer Moogk. S. Kumpf, town clerk.

Toronto, Ont.

Tenders are called until June 6th for main drainage works by the city. G. R. Geary, chairman, board of control. Advertisement in "Tenders and For Sale Department" of this issue.

Welland, Ont.

The following report on various kinds of pavement was issued by Engineer Black: vitrified brick, $26,000; creosoted wood block, $30,500; asphalt block, $20,000; sheet asphalt, $22,300; bitulithic, $21,500; westrumite, $19,000.

Winnipeg, Man.

The approximations for local improvements for 1911 are as follows: asphalt pavements, $600,000; macadam pavements, $10,000; block pavements, $20,000; granolithic sidewalks, $75,000; plank sidewalks, 45,000; sewers, $250,000; water mains, $279,000; streets and lanes, $50,000; boulevards, $10,000; sanitary improvements, $1,000; total $1,340,000. Last year the total amount expended in local improvements was $1,386,111.24. The total amount to be expended upon pavements this year is $856,041. Asphalt macadam is to be used in place of the regular asphalt on residential streets. It [illegible] only about half as much to lay and is as good a pavement for a residential street as any other. This asphalt macadam pavement has only been used for the last few years. The committee does not intend to lay any block pavement at all. Engineer of Construction Astley and Street Commissioner Tallman will start work on the streets at once.

Woodstock, Ont.
Tenders addressed to W. G. Henderson, clerk, will be received until May 8th for construction of the Elliott drain improvement in the Tp. of Blandford. Plans, etc., at office of F. J. Ure, or at the clerk's office, Bright. Tenders are also called for running the stone crusher for said township.

AWARDED

Galt, Ont.
The following were the successful tenderers for supply of cement, castings, lumber, sand and gravel: Ontario Portland Cement Company, Brantford, $1.55 per bbl.; J. J. Stevens Co. (castings), Galt, $2.35 per 100 lbs.; W. I. Reid Co. (lumber), Galt; Dickson & Henderson (sand), Galt, 95c. per load; sand and gravel, 90c. per load.

Halifax, N.S.
Tenders for supply of stone were as follows: stone, for breaking, Samuel Walker, 2½ cents per bushel at Poor Association shed and 4 cents at crusher; J. D. McLellan, 2½c. at shed; Newton Harvey, 2½c. at shed; 3½ cents at crusher. Mr. Harvey's was recommended for acceptance.

Moose Jaw, Sask.
The Sewer and Water Committee recommended that the tenders of the Dominion Sewer Pipe Co., for $12,937.70, the National Iron Works for 6-inch and 4-inch pipe at $39.25 per ton, and Navin Bros., for $51,113, be accepted. It was further recommended that the city engineer call for tenders for storm sewer extensions.

Simcoe, Ont.
Contract for road roller was awarded to Messrs. Cameron & Son for a 10-ton Waterous double engine road roller, $2,750. W. C. McCall, town clerk.

Winnipeg, Man.
The city awarded contracts as follows: supply of c.i. water pipe, the Canada Iron Corporation, Ltd., Montreal, $34.75 per ton; laying 18 in. water pipe line from well No. 7, Engineer of Construction, 40c. per lin. ft.; step-down transformer and equipment for Wells 7 and 8, the Canadian Westinghouse Co., Ltd., $6,400; manhole frames and covers for conduit system, Winnipeg Foundry Co., about $2,906; supply of 25,000 bbls. of cement, W. F. Lee, Winnipeg, 74 1/3c. per net 100 lbs., including sacks.

Railroads, Bridges and Wharves

Arden, Man.
Tenders addressed to M. E. Boughton, secretary-treasurer, Lansdowne, will be received until May 9th for erection of steel truss bridge. The municipality provides the stone and sand, contractor to provide cement and all other material. The bridge is 30 feet span with a clear width of 18 feet. Tenders may be for either part of the work or in block. Plans, etc., at office of the above at Arden or at the Department of Public Works, Winnipeg.

Chatham, Ont.
Tenders addressed to H. Smith, commissioner, box 265, will be received until April 29th for construction of the steel and concrete bridge over Little Bear Creek Drain, Con. 14. Plans, etc., at office of John Welsh, Tp. Clerk, 94 Grand avenue, and with above.

Edmonton, Alta.
Plans for the east end bridge with the modifications required by the Dominion government engineer, have been completed by the city engineer, and tenders for concrete work will be called. Tenders for steel superstructure will not be advertised, the engineer being authorized to confer with the bridge building concerns of importance in Canada and in the United States.

Fort William, Ont.
The Inland Navigation Co., Ltd., who recently purchased about 1,200 feet frontage on the Kaministiqua river, will erect thereon a dock and large transfer shed.

The Northern Navigation Company will construct a dock and passenger terminal on the Kaministiqua river near the new Union station of the C. P. R. and G. T. P. Railwa.

It is stated on good authority that the G. T. P. Ry. will construct about 20 miles of new track in their terminals on Mission Island and will construct one, and perhaps two, steel docks and sheds on the Mission river.

Guelph, Ont.
The city council decided to construct a bridge over Heffernan street at an estimated cost of $7,500.

Lethbridge, Alta.
Tenders addressed to N. E. Brooks, division engineer, C. P. R., Calgary, will be received until April 31st for construction of concrete work and timber approaches in connection with overhead bridge. Plans, etc., at office of above; at Asst. Chief Engineer's Office, Winnipeg; City Engineer's Office, Lethbridge.

New Ireland, Que.
Tenders are called by the Corporation of South Ireland and South Halifax for construction of iron bridge on the site of the Chaine bridge. Plans, etc., with Dr. L. J. A. Sirois, sec.-treas., St. Ferdinand d'Halifax.

New Westminster, B.C.
The Lulu Island bridge by-law for $30,000, carried.

Point Sapin, N.B.
Tenders addressed to R. C. Desrochers, Secretary, Public Works Department, will be received until May 9th for construction of a breakwater here. Plans at above department, at the office of district engineer, St. John, N.B., and on application to the local postmaster.

St. John, N.B.
The C. P. R. is calling for tenders for the removal of the buildings on Mill street to enable them to proceed with the erection of new terminal buildings. They must be out of the way by May 31st.

Toronto, Ont.
Tenders addressed to G. R. Geary, chairman, board of control, will be received until May 23rd for construction of dock in Ashbridge Bay. Specifications upon application to Department of Railway, Bridges and Docks, City Engineer's office. Advertisement in "Tenders and For Sale Department" of this issue.

Vancouver, B.C.
The C. P. R., it is understood, will replace thirteen wooden bridges between Vancouver and North Bend with steel and concrete structures, and will put up thirty new bridges along the same stretch of line.

Walkerton, Ont.
Tenders are called until May 16th for erection of Warren Truss steel bridge at Dunblane. James Warren, engineer. Advertisement in "Tenders and For Sale Department" of this issue.

Welland, Ont.
Tenders addressed to Donald Dell, reeve, will be received until April 29th for construction of two concrete piers at Geo. Heximer bridge over Lyons Creek, Willoughby Tp.

AWARDED

Niagara Falls, Ont.
The contract for constructing five steel-concrete bridges has been awarded to Rutherford & Patten, of St. Catharines, Ont. J. H. Jackson, Superintendent Queen Victoria Park Committee.

Ottawa, Ont.
It is reported that the Canadian Northern Railway has awarded the contract for the section of the Toronto-Ottawa line from Sydenham to the terminus, to Mullarkey & Company, Carleton Place

Owen Sound, Ont.
The contract for the erection of bridges, on at Tenth street, cement arch construction, $16,475; the other, wooden structure, $1,765, was given to Messrs. Green & Clark. Town Engineer, R. Macdowall.

Public Buildings, Churches, Schools, etc.

Belleville, Ont.
The new school will be erected on the St. Agnes school property as soon as possible. W. P. Hudson, chairman, board of eduction.

Caughnawaga, Que.
Tenders addressed to J. O. McLean, assistant deputy secretary, Department of Indian Affairs, will be received until May 8th for erection of 2-storey brick veneer school house and 1-storey frame school house on the Reserve.

Charlottetown, P.E.I.
Tenders addressed to Murdock Macleod, secretary, building committee, 233 Richmond street, will be received until May 15th for erection of a brick and stone church and school for Zion Presbyterian congregation. Specifications at office of C. B. Chappell, architect.

Edmonton, Alta.
Tenders addressed to John Stocks, deputy minister of public works, will be received until May 15th for the plumbing, heating and ventilation required in connection with the Parliament Buildings here. Plans, etc., at the Engineer's Office, New Parliament Buildings, Edmonton, or at the office of the

consulting architect, Wm. Fingland, Enderton Block, Portage avenue, Winnipeg.

Fenelon Falls, Ont.

Mr. Taylor, Barrie, is the architect in charge of the erection of new Methodist church here, 52 x 78 feet; cost, about $10,000.

Fort William, Ont.

A campaign to raise $100,000 for Y. M. C. A. purposes has been started.

Plans for the proposed Greco Orthodox Church have been approved. Peter Pascar and Geo. Prikaska are interested.

Galt, Ont.

It has been decided to inaugurate a campaign to raise at least $50,000 to build a Y. M. C. A. building. J. W. Hopkins, Prov. Field Secretary.

Guelph, Ont.

It is generally understood that the Winter Fair board have under consideration the erection of a new exhibition building which will entail considerable outlay.

The property committee, composed of Messrs. H. G. Cockburn, D. D. Christie, Col. J. Davidson, A. Stewart and Dr. J. Lindsay, were authorized to arrange at once regarding plans for the new Y. M. C. A. building, for which the required amount has been raised.

Grenfell, Sask.

The Presbyterians here are considering the erection of a new church. Plans are being prepared.

Kamloops, B.C.

Tenders addressed to F. E. Simpson, secretary, hospital committee, will be received until May 6th for the erection of the new brick hospital building (plumbing and heating contracts segregated). Plans, etc., at office of the architect, S. B. Birds, 306 Loo Building, Vancouver, or on application to the secretary.

Kerwood, Ont.

Tenders are called until May 9th for erection of new school at S. S. No. 7 Adelaide. Plans with J. H. Richardson, secretary-treasurer, Box 5, Kerwood.

Kingston, Ont.

W. Ellis is preparing plans for a new 8-room school. Tenders will be called next month. Estimated cost, $30,000. Materials, brick on limestone foundation.

W. Newlands, architect, has about completed plans for a $40,000 addition to the local post office. Tenders will be called for in the next week or so. The addition will be of stone to match the present building.

Lytton, B.C.

Tenders are invited until May 11th for erection of a timber-framed school house here by Public Works Department, Victoria.

London, Ont.

Tenders are being called until May 9th for erection of a new school at S. S. No. 7 Adelaide. J. H. Richardson, sec.-treas., Box 5.

Macleod, Alta.

It is more than probable that the new post office will be erected this year. Estimated cost, $10,000.

Medicine Hat, Alta.

Competitive plans for the erection of a 10-room, 2-storey brick school building with stone facings, are requested until April 25th by E. J. Fewings, secretary-treasurer.

Moncton, N.B.

The site on High street has been recommended by the fire committee for the new fire hall. It is likely that a St. John architect will draw plans. Chairman Bourque.

Montreal, Que.

The Protestant Board of Education will enlarge the Fairmount school by the addition of 15 class rooms, gymnasium, etc. S. J. Binmore, treasurer.

Permit has been issued for the erection of a new church for the parish of St. Elizabeth du Portugal in St. Henry Ward, at a cost of $56,000. Architects, Messrs. McDuff & Lemieux.

The Catholic School Commissioners of Villeray have taken out a permit for the erection of a school on Labelle st., the estimated cost of which is $47,000. Mr. Z. Trudel is the architect, and Mr. Zenon Corbeau the general manager.

A new Catholic Normal School is to be erected at the corner of Sherbrooke street and Atwater avenue for the congregation of Notre Dame at a cost of $150,000. Messrs. Marchand & Haskell are the architects. The general contractors are Messrs. Marineau & Prenoveau.

New Westminster, B.C.

The by-law to raise $95,000 for school purposes carried. That for the high school was defeated.

Nelson, B.C.

The directors of the Kootenay Lake General Hospital Association have decided to erect a new building, at a cost of approximately $60,000.

Ottawa, Ont.

A move is on foot to form a company to erect a large auditorium for musical events.

It is proposed to erect a new club house for the O. A. A. C. on Queen street. C. Ross, president.

Hugh Carson has purchased the Grand Opera House and expects to convert it into a commercial building.

The Westminster Presbyterian congregation appointed a committee to get plans for the new church to be erected at the corner of McLaren & Lyon sts. Ambrose Duffy, treasurer, board of managers.

Port Hope, Ont.

The public buildings under consideration are new or remodelled public school (central bldg.); Carnegie public library, $10,000; fireproof hospital.

Tenders addressed to J. A. Ewart, architect, 193 Sparks street, will be received until April 28th for addition to the laundry building, for the Carleton General Hospital.

Prince Albert, Sask.

Tenders are called until May 8th for construction of a 4-room school house with basement. H. W. Halpin, secretary, Prince Albert, East School District

Quebec, Que.

A company incorporated as The Frontenac Athletic and Land Company and capitalized at $145,000, have under consideration the erection of a large hockey rink on the Q. A. A. grounds. Senator Choquette, president, Quebec Hockey Club; others interested are N. Lavoie, general manager Banque Nationale, and W. J. Ray, H. E. Price, and J. G. Scott.

Regina, Sask.

Tenders addressed to J. R. C. Honeyman, secretary, public library board, will be received until April 29th for erection of library building. Plans, etc., at office of the architects, Storey & Van Egmond.

Saskatoon, Sask.

A by-law for $185,000 for erection of new hospital will be submitted to the ratepayers.

The plans for the new school to be built on the Alexandra school grounds are complete and tenders for erection will be asked. Architect Webster; estimated cost, $54,000.

Shawville, Que.

Tenders addressed to the school commissioners, will be received until May 10th for construction, with supply of materials of a new Academy building to be completed before December 31st. Tenders received either separately or collectively for all, one or more of the following trades: masonry and brick work; carpentry; painting; roofing. W. K. Ireland, secretary-treasurer.

South Vancouver, B.C.

The Mountain View Methodist Congregation will call for tenders for their new church. Brick, as well as wood, has been specified. Architect Horel has drawn plans for both.

Stettler, Alta.

This municipality have under consideration the erection of additional municipal buildings. D. Mitchell, secretary-treasurer.

Stratford, Ont.

J. S. Russell, architect, has been engaged to prepare a preliminary sketch for the new St. Andrew's Church. Noted in last issue.

Sydney, N.S.

The plans of the new building for the Y. M. C. A. are on view. They show a building either of reinforced concrete or brick. A new anad larger site will be purchased. Secretary, Mr. Thorburn.

Thamesville, Ont.

The town hall here was destroyed by fire on the 23rd inst. The fire apparatus was also burned. Total loss, about $20,000.

Toronto, Ont.

The Musical Protective Association will build a home for its members on University avenue at a cost of $15,000.

The congregation of the African Methodist Episcopal Church has secured a building site on University avenue. Pastor, Rev. T. H. Henderson.

The Board of Trade have directed the attention of the Dominion Government to the inadequate accommodation of the Dominion government buildings here. W. J. Gage, president.

Tenders for erection of fire hall on Balmoral avenue, will be received until May 8th for masonry, carpentry, galvanized iron and roofing, etc. Advertisement in Tenders and For Sale Department of this issue.

The Public Library Board have decided to request the city council to provide the sum of $75,000 for library purposes. Of this, $65,000 is required for the purchase of a site and the cost of a building, equipment, etc., for a new branch library to be built in the vicinity of Bloor sreet and Dovercourt road. Chairman, N. B. Gash, K.C.

The congregation of Holy Trinity Church will erect a parish house on north side of Trinity Square to cost about $10,000. The congregation of Ste. Anne have decided to erect a new Sunday school building at a cost of $45,000; St. Barnabas congregation, cor. of Givens and Halton streets, will erect an extension to cost $10,000; Rev. L. B. Vaughan, rector; St. John's, West Toronto, will have plans prepared for a new parish house and Sunday school; a building site was presented to St. Olave's Church, Swansea, and a committee appointed to consider ways and means for the erection of the new building.

Vancouver, B.C.

The Women's Club have secured a suitable site for their new building. Mrs. J. H. MacGill, president.

The Vancouver Rowing Club will call for tenders for a new club house. Harris, Sawers & Woodward, committee; architect, Kiggie.

The by-law to raise $150,000 for the immediate erection of city hall and office building, etc., will not be submitted for at least six months. Noted in issue of April 5th.

The congregation of St. James have purchased their building site on Pender street. Construction on the building will start this spring. The structure will be probably of stone. Rector, Rev. H. G. Flennes-Clinton.

Alexander & Brown are preparing plans for the erection of new church for the congregation of St. James' Church on the southeast corner of Pender street and Carl avenue. Estimated cost, $150,000. Rev. H. G. F. Clinton, rector.

Tenders are called by Public Works Department. Victoria, until May 4th for erection of Janitor's Lodge, Normal School. Plans, etc., at the office of William F. Gardiner, architect, Vancouver, B.C., and the department of public works, Victoria.

Excavation will be completed shortly for the 12-room additions to the King Edward and Brittania High schools; and the school to be erected at the corner of Sixth avenue and Bayswater st. It is expected that tenders for erection of same will be called in a few days.

Victoria, B.C.

Tenders for erection of St. John's Anglican Church will be called probably early in June. Estimated cost, $80,000. W. Ridgway Wilson, architect, Pemberton Block.

Webb, Sask.

The public school here was destroyed by fire recently. Estimated lass, $6,000.

Welland, Ont.

A committee consisting of H. F. Stoddard, Dr. Howell, D. Ross and others have been asked to report on the proposition to erect an industrial and technical school here.

Winkler, Man.

Tenders addressed to B. Loewen, chairman, school board of Winkler S. D., will be received until May 15th for erection of 4-roomed brick school house, the contractor supplying no material; tenders are also called until May 15th for the following material for a 4-room school house: brick, cement and lime; coarse and fine gravel; lumber, metallic ceiling, hot water heating system.

Winnipeg, Man.

Plans for erection of the new Westminster church are complete and call for a church which will cost over $200,000.

Harry J. Rill, 54 Buhl Block, Detroit, Mich., is the architect for the Ignatius R. C. Church; cost, $150,000; tenders will soon be called. Noted in last issue.

Preliminary plans for erection of All Saints Church have been prepared which call for an expenditure of about $50,000. No immediate action will be taken.

Plans, etc., for a new building for the municipality of Assiniboia have been prepared by Hooper & Hooper. Dimensions, 49 x 40; material, stone and brick; two storeys.

Tenders addressed to Western Trunk Lands Building and Development Corporation, Limited, were called until April 23rd for the construction of a moving picture theatre at Transcona. Plans, etc., at the office of the Transcona Theatre Company, 537 Main street, Winnipeg.

AWARDED

Blairmore, Alta.

Frayer & Sinclair have commenced the erection of the new opera house. Cost, $50,000.

Morwood, Ont.

Gilbert Emard,of Embrun, has been awarded the contract for the continuation school at Morwood. C. P. Meredith, Ottawa, architect.

Vancouver, B.C.

The contract for erection of 12-room addition to the Lord Nelson school has been awarded to D. Matheson, $73,300,

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Residences

Athens, Ont.

Tenders addressed to R. B. Patterson, secretary of building committee, will be received until May 1st. Plans, etc., at the store of Karley & Purcell.

Hamilton, Ont.

Munro & Meade, architects, have prepared plans for the new residence to be erected for E. Phin, Welland, at a cost of $30,000.

Montreal, Que.

Permit has been taken out by Messrs. W. Robb and D. R. Brown for a new three-storey residence at 718 Pine avenue west at an estimated cost of $50,000. Messrs. Brown & Vallance are the architects; contractors, Bonnell Bros.

Messrs. R. P. & H. A. Adams have taken out a building permit for a four-storey house of solid brick at the corner of Prince Arthur street and Oxenden avenue. Estimated cost, $79,000. Mr. H. A. Adams is the architect; Messrs. Byers & Anglin, contractors.

Messrs. Saxe & Archibald have in hand the plans of a $12,000 house for Mr. R. E. Thorne, to be constructed on Cote des Neiges road. The same firm is preparing plans for extensive alterations to the residence of Mr. Edward Hanson at Ste. Agathe des Monts.

Ottawa, Ont.

W. E. Noffke is calling for tenders for the alterations to W. H. A. Fraser's residence, Nepead street.

M. Drazin is erecting stores and apartments on Rideau street. Jas. Ewart, architect, is calling for tenders.

Port Arthur, Ont.

Messrs. Hunt & Reed have begun the construction of fifteen modern houses on Court. Total estimated cost, $70,000.

Porcupine, Ont.

W. R. Graham, Cobalt, has prepared plans for 2,000 bungalows for the Philadelphia Mining Company.

Toronto, Ont.

A large three-storey apartment house is to be erected on Bathurst street by the Dundas Building Company. Work will commence about May 1st.

Bond & Smith are the architects for the apartment house on Prince Arthur avenue to be erected for C. H. Wilson, $12,000. Contracts have been let.

Permits have been issued to J. T. and H. Hutson, apartment house, Avenue road and Cumberland street, $80,000; N. Butler, apartment house, Harvard avenue, $20,000.

The property at 21 Isabella street has been purchased by Mr. Fleury, of Montgomery, Fleury and Montgomery, barristers. It is stated that an apartment house will be erected. J. A. Thompson, barrister, is also interested.

Winnipeg, Man.

Tenders addressed to Hooper & Hooper, architects, 303 McIntyre block, will be received until April 29th for erection of a stone and frame residence for E. G. Parker.

AWARDED

Ottawa, Ont.

The following contracts have been awarded for the residence of E. C. Russell on Buenavista road, Rockliffe, C. P. Meredith, architect; A. Garvock, masonry; Larkin & Adams, carpenters; Ritchie & Nunn, painters; Blyth & Holloway, plumbers; James McLaughlin, plasterer, and J. Saunders, electrician.

Winnipeg, Man.

E. E. Wire, Kennedy building, has received the contract for the first instalment of a number of small dwelling houses to be erected here by W. H. Henry, Esq., a capitalist in the Old Country. The houses will be erected in accordance with the new health act of Manitoba under the personal supervision of the architect, William Bruce.

Business Buildings and Industrial Plants

Belleville, Ont.

The city council have decided on Church street as the site for the C.N.O. R. station.

Calgary, Alta.

Hodgson, Bates & Butler have prepared plans for the large addition to

Pryce Jones Ltd. store. Cost, about $150,000.

The Alberta Pressed Brick Company propose erecting a factory here to be completed by July 1st. Local labor will be employed. Plans call for a capacity output of 40,000 bricks per day. J. Ferrier, Jr., consulting engineer, of the Steger-Farrier-Silica Brick Company, Bonham, Texas, has selected a site.

Hodgson, Bates & Butler, architects, have prepared plans for the alterations to be made to the Bank of Montreal, $25,000. Permits were issued to A. McBride & Co. for wholesale warehouse on Tenth avenue, $40,000; also to M. Fraser, East Calgary, for 3-storey store and apartment house, $23,000.

Edmonton, Alta.

Permit was given to Cushing Bros. for their warehouse, $24,000.

Tenders are called until April 29th for erection of 3-storey building for J. A. Lockerbie. H. A. Magoon, architect.

The Imperial Oil Company will erect their central tank plant on Twenty-first street. Estimated cost of the building, about $25,000; total cost, $60,000. J. A. Boyd is interested.

Plans are being prepared for the 3-storey brick and stone building to be erected for William Sugarman. It is also stated that Jackson Bros., jewellers, will erect a 3-storey block this year.

Tenders will be called for erection of a strictly up-to-date fireproof office building for Drs. J. D. Maclean and W. N. Condell on Jasper avenue. The building will be 51 x 150 feet, 6-storeys, with provision for four more storeys to be added. The intention is to have it completed by 1st of December. J. E. Wize, architect, 534 Jasper avenue west.

Fraser Mills, B.C.

The Canadian Western Lumber Company, Fraser Mills, B.C., are contemplating the erection of further additions to their plant this year. These are to include another planing mill, box factory, sash and door factory and a woodworking factory.

Hamilton, Ont.

The Lyons Tailoring Company will erect a modern 4-storey building on their present site on James street.

Hull, Que.

The council have granted permission to N. St. Denis for the erection of a $24,000 abattoir here.

Kippewa, Ont.

The following buildings were destroyed by fire on the 23rd inst.: C. P. R. station, the large store of Shannon and Fraser, and John Lumsden's store and hotel. Total loss, $50,000.

Kingston, Ont.

The Canadian Bank of Commerce are about to erect a new bank on the corner of King and Brock streets. Plans have been prepared by Darling & Pearson, architects, Toronto. Tenders will be called early next month. Power & Sons, local architects.

Lacombe, Alta.

Tenders addressed to N. E. Brooks, division engineer, C. P. R., Calgary, will be received until May 1st for construction of a combination brick and frame station. Plans, etc., at Assistant Chief Engineer's office, Winnipeg, and at office of above.

Lethbridge, Alta.

The Great West Saddlery Company have under consideration the location of a branch here. R. J. Hutchings, Calgary, representative.

Matheson, Ont.

Tenders addressed to A. J. McGee, secretary-treasurer, T. & N. O. Ry. Commission, 25 Toronto street, Toronto, will be received until May 3rd for construction of a passenger station here. Plans, etc., at office of the architect, J. M. Lyle, 14 Leader Lane, or at the office of the chief engineer, North Bay.

Medicine Hat, Alta.

A by-law was carried granting a free site to the Alberta Linseed Oil and Paint Company, which will invest $180,000 in plant and buildings. By-laws will be voted upon early in May granting concessions to a foundry and machine shop, a glass works and a nail factory.

Montreal, Que.

Tenders are called until April 29th by Messrs. Brown & Vallance for erection of the new Herald building.

Permits were issued for warehouse in St. Henry, $25,000, and for an hotel on Mount Royal avenue, $32,000.

Nelson, B.C.

Tenders for the excavtion for the new jam factory to be built at the corner of Vernon and Kootenay streets for J. A. McDonald, are being called. Plans being prepared by A. Carrie, architect, call for a 2-storey building, 100 x 50 feet.

Ottawa, Ont.

The Gibson property, Bank street, has been sold to W. H. Lester, contractor. It is understood that Mr. Lester will erect a row of stores in the near future.

Pain Court, Ont.

Tenders addressed to T. H. Taylor Co., Ltd., Chatham, Ont., will be received until April 26th for construction of a grain elevator of crib work construction, metal clad and metal roofed with a concrete foundation. This elevator will be placed at the terminus of the C. W. & L. E. Railway. Plans, etc., at office of the above.

Port Arthur, Ont.

It is stated that a match factory will be located here. J. O. Hourigan, manager, Marks-Clavel-Dobie Company, is interested.

Work on the construction of the plant for the Port Arthur Wagon Works Co. will start at the beginning of May. Capitalization of company, $750,000. Mr. Fox, secretary-treasurer.

Port Hope, Ont.

The Standard Ideal Co. are planning extensions to plant No. 1.

Preston, Ont.

The Canadian Buffalo Sled Co. will erect a new 2-storey factory on the property adjoining Clare Bros. foundry. Mr. Mickler is preparing plans.

Prince Albert, Sask.

The Royal Bank of Canada have purchased the corner of Tenth street and First avenue west.

Quebec, Que.

The improvements to the plans of the new union station will increase the cost of the structure from three quarters of a million to a million and a half. The station building is now to be 350 feet long, and it is expected that construction will be commenced early in the summer.

Tenders are called for erection of Quebec Bank here. Messrs. Brown & Vallance, architects, Montreal.

Renfrew, Ont.

A. Moon, of Bowmanville, and J. A. Kincald, of Eganville, are mentioned in connection with a new hotel here.

Regina, Sask.

Tenders were called until April 17th for removal of buildings, etc., for the Canadian Bank of Commerce.

Tenders are called until April 27th for erection of bank building for the Imperial Bank of Canada. Storey & Van Egmond, architects.

Sarnia, Ont.

A site for the new sash and door factory has been found. A. H. Diver, Trenton, is interested.

Saskatoon, Sask.

Mr. B. Ward, representing Minneapolis interests, has purchased a building site near here for a factory to make flax binder twine.

Plans are under way for a 4-storey business block to be erected on the southeast corner of 22nd street and 2nd avenue for Mr. H. Weston. The materials are brick with a stone or terra cotta front.

St. Catharines, Ont.

The Yale & Towne Mfg. Co., Stamford, Conn., manufacturers of Yale locks, will locate their Canadian branch here. A suitable site has been secured; work on building will commence. A Canadian Company has been incorporated. Estimated total cost, $50,000.

St. Remi, Que.

We are informed that the tenders for the factory and warehouse to be erected for W. Clark will probably be called for April 29th or possibly a week later. Messrs. Peden & McFarlane, architects, Montreal.

Strathcona, Alta.

The Commercial Hotel Company have purchased the property on the eastern side of the hotel, thus providing a splendidly located site of three lots for the 3-storey brick hotel for which excavation will be made this year. Estimated cost, about $60,000.

Toronto, Ont.

Conduits, Limited, will build an 80 x 150 ft. addition to their factory on Don Esplanate; Bond & Smith, architects.

The "Saturday Night" Publishing Co. will erect on the corner of Richmond and Shephard an 8-storey building. H. Gagnier, president.

Brigdens, Limited, will erect a 5-storey engraving plant at 4 Richmond street west. The dimensions will be [illegible] x 100 feet, cost about [illegible], fireproof construction. Architects, Bond & Smith.

The R. S. Williams & Sons will erect a business building at [illegible] Yonge street. Messrs. Chapman & McGiffin, architects. The Boston Lunch, Limited, it is stated, will erect a 6-storey building this summer.

Windsor, Ont.

A. L. Iron will erect a large block here this year with a frontage of [illegible] feet on [illegible] Avenue. Negotiations have been resumed. Committees of the city and county councils will confer regarding the offer to lease part of the building for county offices.

The Imperial Garage Company will build a garage on Osborne Place to cost about $25,000, of reinforced concrete with single span roof.

Winnipeg, Man.

The Anthes Foundry Company, Toronto, has purchased a building site for their new plant; Wortman & Ward, manufacturers of pumps and farm tools, will extend their plant.

The plans for the new government telephone exchange building have been approved. Plans call for a 4-storey building, 50 x 130 feet; cost, $75,000. Provincial architect, S. Hooper.

It is stated that when the large flour mill operated in Pilot Mound until destroyed by fire, is re-built, that Winnipeg is the probable location. Nicholson & Bain, Bannatyne East, commission agents, are interested.

The plans for the new G. T. P. hotel here have been approved by head office. The detailed plans are now under way; when completed, construction will commence shortly. Messrs. Ross & McFarlane, Montreal, architects.

AWARDED

Calgary, Alta.

The contract for part of the erection of business block for Judge Travis has been let to J. A. Brocklebank, $100,000, exclusive of plumbing, heating and wiring.

Carleton Place, Ont.

Speagle & Smith, Westport, were given the contract for erection of church here, $4,470. The other tenders ranged from $3,300 to $5,000. J. W. H. Watts, 45 Central Chambers, Ottawa, architect.

Durham, Ont.

Mr. W. A. Mahoney, architect, Guelph, has had his plans accepted for the erection of a new $10,000 Carnegie Library here.

Guelph, Ont.

The contracts for the four new buildings at the Homewood Sanitarium have been let to Secord & Son, Brantford, $[illegible]

Little Manitou Lake, Sask.

The contract for erection of sanatorium has been awarded to Brown Construction Company, Builders' Exchange, Winnipeg, $28,800.

Ottawa, Ont.

The general contract for erection of business building on York street for K. Farrah has been given to George Crain, $30,000. W. E. Noffke, architect.

Owen Sound, Ont.

The contract for erection of new Bell Telephone building here will probably be awarded to Pounder Bros., Stratford. The tenders for reinforced concrete work, of which there is a large amount, were high.

Outremont, Que.

The contract for erection of fire and police station here was awarded to T. Lessard, $11,410; carpentry, Jackson Co., $7,675; roofing, R. Limards Co., $680; electric lighting, J. C. Duff, $125; plumbing, Tremblay & Francoeur, $1,346.60; plastering, G. Bowen, $630; total, $21,866.60. J. Kruse, secretary-treasurer.

Preston, Ont.

Messrs. Wiraching Bros. have the contract for erection of 3-storey addition to the Crown Furniture Company' plant. Messrs. Moss & McGillivray, managers.

Regina, Sask.

The contract for erection of the first section of the buildings for the Methodist College here was awarded to Robert J. Lecky, $268,780. At the present time Mr. Lecky is manager here for Peter Lyall & Sons.

Saskatoon, Sask.

The contract for construction of a new departmental store building has been awarded to A. A. Godwin, $150,000, exclusive of the structural steel work, which has been awarded separately at a cost of $30,000.

South Vancouver, B.C.

The contract for clearing the Tweedy school site of nearly four acres was let to Messrs. Halliwell & Sons, $475 per acre.

Stratford, Ont.

The contract for ventilation of the House of Refuge has been awarded to McDonald & Henry.

Victoria, B.C.

Plans for a 4-storey building to be erected on the north side of Fort street have been prepared for Mr. P. R. Brown by Mr. Thomas Hooper. The contract has been let to Messrs. Ferris & Barff. Estimated cost, $50,000.

Winnipeg, Man.

Carter-Halls-Aldinger Company have been awarded the contract for the building of an upholstery shop, 100 feet by 40 feet, and also for a transfer table in the shops of the C. P. R. in Winnipeg.

Power Plants, Electricity and Telephones

Lethbridge, Alta.

The tenders of the Westinghouse Co. for supplies for electric light extension in the arc system was recommended by superintendent Reid for acceptance.

London, Ont.

The report of Superintendent Glaubitz on the added necessary expenditure for the distribution of Niagara power was as follows: Sub-station equipment, $8,600; meters, $10,180; meter inspection, $2,000; 2,300 volt bent line, $4,559; primaries, $500; secondaries, $4,390; lighting system, $2,500; transformers, $3,900; power services, $150; power meters, $1,550; series street lighting, $6,800; underground system, $5,150; painting poles, $3,250; draughting room, $400; testing apparatus, $500; motor generator, $10,000; power solicitors, etc., $4,000; lamp renewals, $2,000; total, $70,429.

Magog, Que.

An electric light and power plant will be constructed here at about $100,000. Engineers, Pringle & Sons, Montreal.

New Westminster, B.C.

The electric light and water extensions by-law has carried.

Ottawa, Ont.

In view of the fact that paving operations will be commenced on Sparks street in the course of about ten days, it seems well to go ahead with the underground conduit system at the same time, for which the city engineer has prepared plans. Engineer Duckworth, G. N. W., Toronto, will come here to confer with the city engineer, the local telephone and Ottawa Electric companies and others interested in the laying of the conduits. Providing an amicable arrangement can be arrived at all the poles on Sparks street will be removed and telegraph, telephone, Ottawa Electric, Municipal electric and other wires will pass through the conduits under the sidewalks. In order to do away with the poles supporting the trolley wires the city engineer has planned to have the sustaining wires attached to the buildings on either side of the street. This is a new way and as yet untried in any other City. Mayor Hopewell; City Engineer, N. J. Ker.

Peachland, B.C.

Tenders will be received until May 1st for $3,000, 5 per cent., 20 years, electric light system and $1,000, 5 per cent., 20 years, local improvements. H. McDougall, clerk.

Penetanguishene, Ont.

The ratepayers will vote on May 1st on the question of the agreement between the municipality and the Penetanguishene and Midland Electric Street Railway, Light and Power Company, Limited, for the purchase of the latter, etc., and to provide for further extensions. W. H. Hewson, town clerk.

Port Arthur, Ont.

Tenders are called until April 29th for supply and delivery of the following:—20,040 feet standard steel rails, (80-lb.); 674 pairs angle bars with 6-in. centres; 105 pairs angle bars with 6-in. 5-in. 6-in. centres; 26,000 5½ x 9-16 spikes; 3,300 4½ x ⅞ bolts. Delivery on or before May 25th, 1911. Tenderers to quote price f.o.b. point of delivery. J. McTeigue, City Clerk.

Prince Albert, Sask.

Tenders addressed to the City Commissioners are called until May 31st for supply of electrical machinery. A. Holmes, C. O. Davidson and F. A. Creighton, city commissioners. Advertisement in "Tenders and For Sale Department" of this issue.

The City Commissioners have accepted the following quotations for electrical supply material for year: cross-arms, to the Cameron Lumber Co.; cedar poles, two 2-car lots, Lindsley Bros.; copper wire, Eugene Phillips Electrical Works; also accepted quotation of Vandeleur & Nicholls for one 15 h.p. induction motor to be used for driving new elevating machinery in connection with present rock-crushing equipment. R. Wright, city electrician.

Portage la Prairie, Man.

The power committee appointed W. E. Skinner, Electrical engineer, of Winnipeg, to give an estimate of the cost of a transmission line from Winnipeg to this city; also the cost of replacing the plant of the Central Electric Company and the cost of a transformer station at this city.

Saskatoon, Sask.

The city engineer has been authorized to secure information on the cost of installing, operating and maintaining a street railway here as a municipal enterprise. Prof. Greig was instructed to report on the relative methods of producing power for the city's use.

Stettler, Alta.

The council contemplate the installation of an electric light plant costing $17,000. D. Mitchell, secretary-treasurer.

Swift Current, Sask.

Tenders addressed to O. G. Manwaring secretary, Prairieville Rural Telephone Co., Box 371, will be received until April 28th for construction per pole mile of about 11 miles of rural telephone line out of this town. The provincial government supply the poles free, delivered and placed.

Toronto, Ont.

Tenders addressed to G. R. Geary, chairman, Board of Control, will be received until April 25th for supply of rubber insulated wire.

The time for receiving tenders for electric waggons is extended until May 23rd; that for testing transformer until May 9th. G. R. Geary, mayor.

Vancouver, B.C.

Notice has been given of the application of the Howe Sound Power Company, Ltd., for water rights for power purposes on Furry Creek, a stream which flows into Howe Sound. The amount of water applied for is forty cubic feet per second, and in connection with the application for the water record the company has also filed a request to store water in the lakes at the head of the creek by the construction of dams. The Howe Sound Power Company, the details noted in their application show, that the plans in mind are extensive. The water record asked for is equivalent to 1440 miner's inches and the point at which the supply is to be taken has an elevation of 1,000 feet. The water is to be taken from both the north and south forks of the creek. The application for the right to store water in connection with the power plant covers the construction of dams at the outlets of the two lakes forming the sources of Furry Creek. These are located at an elevation of 2,500 feet and now have an area of eighty-two acres. The plans propose dams thirty feet in height, which will increase the area of the lakes to 122 acres.

Victoria, B.C.

For the purpose of carrying out the extensive additions to the city's street lighting system the following apparatus and plant will be purchased: Thirty-five thousand feet of three-inch fibre conduit, at $7.50 per hundred feet; $50,000 feet of one inch galvanized steel conduit at $8.40 per hundred feet. Tenders will be called for a supply of 150 cedar poles; 8,000 pounds of copper line wire; 1,000 pounds of flexible arc cable; 1,000 glass insulators; 150 magnetite arc lamps and cut outs; 4.50 light transformers, and 1-20 circuit arc switchboard.

Winnipeg, Man.

Tenders are called until May 15th for supply of six 500 k.w. stepdown transformers for sub-station No. 1. M. Peterson, secretary, board of control. Advertisement in Tenders and For Sale Department of this issue.

AWARDED

Kingston, Ont.

The acceptance of the Canadian General Electric Company's tender for a better lighting system for the city was recommended to the council.

Moose Jaw, Sask.

The contract for the power house and car sheds for the Moose Jaw Electric Railway Company has been let to Navin Bros. The buildings will cover a space of 250 x 63 feet.

Vancouver, B.C.

An additional 10,500 horse power is being added to the generating plant of the British Columbia Electric Railway at Lake Buntzen, and contracts for the installation of the generator, water wheel and pipe line have been let as follows: The Canadian General Electric Company received the contract for the generator; McDougall & Co. the contract for a Dobie water wheel. McDonald & Godson, a local firm of contractors, were given the contract for laying the large pipe connecting the power house with the dam at the lake. The installation of the mammoth wheel will make the fourth of its kind at Lake Buntzen, which along with three 3,000-horse power generators are already generating power for the company's systems on the mainland. Work on the latest addition will be completed in October.

Victoria, B.C.

Messrs. Hutchinson Bros. will be awarded the contract for the installation of the electrical system for the cluster lights on Fort street, $1,400. This price does not include the iron standards.

Miscellaneous

Fort William, Ont.

An unusually large body of iron pyrites has been discovered at Lake Manitou, near Fort William, by an old prospector and miner from Cobalt. The lode measures 76 feet wide in the massive form. This is the second rich discovery in the district during the spring. Several hundred men are now prospecting New Ontario for gold, silver, pyrites and iron ore.

Ottawa, Ont.

The contract for the construction of the Plaza Laurier here has been awarded by the Government to McGillivray and O'Toole, of Ottawa, $235,000.

Tenders addressed to L. K. Jones, secretary, Department of Railways and Canals, will be received until May 5th for improving Lower Extreme to Lock No. 24. Rapide Plat Canal. Advertisement in "Tenders and For Sale Department" of this issue.

The following building permits have been issued recently: Ottawa Car Co., lumber shed, Slater street, $4,500; R. E. McKinstry, dwelling, Oakland avenue, J. H. Ashfield, owner, $4,000; James Davidson, apartments, Wellington street, A. Tracy, architect, $24,000; Jos. Landreville, storeroom and dwelling, Sparks street, $6,000; Alex. Betcherman and D Merskey, dwelling, Clarence street, $5,000; P. Villeneuve, dwelling, Laurier avenue west, W. A. Charlebois, builder, $3,500; A. K. MacDonald, dwelling, Archibald street, $2,500; A. Charpentier, dwellings, $9,000; S. Coplan and O. Petegorsky, dwelling, Clarence street, $5,000; Edward Pranke, dwelling, Havelock street, A. W. Clarke, builder, $2,800; W. H. Campbell, dwelling, [illegible] avenue, $3,000; Mrs. A. Hickey, dwelling, W. J. O'Connor, builder, $3,000; H. Miller, store and dwelling, Bank street, W. H. George, architect, Alex. Christie, builder, $11,000; Frank Bessenotte, apartments, Park avenue, George Roy, builder, $4,225; Frank Bossie, dwelling, Laurier avenue west, $5,000; J. Hope & Son, alterations, Sparks street, W. E. Noffke, architect, Holbrook & Sutherland builders, $5,000; F. Diamend, dwelling Lyon street, $9,000; Bethany church, Bethany street, J. A. Ewart, architect, $18,000; A. G. Marshall, warehouse, Catharines street, $3,000; Wm. Gardner, dwelling, Heney street, $4,000; David Cuthbertson, dwelling, Clemow avenue, $6,000; Wolf Shengman, dwelling, Besserer street, $4,500; J. D. Wilson, shop, Bank street, $2,500; Mrs. William Robertson, dwelling, Monkland avenue, Alex. Robertson, builder, $3,500; William Moore, dwelling, Springfield road, C. P. Meredith, architect, James Moore, builder, $2,800; Fred Hunt, dwelling, LeBreton street, $3,000; A. K. McLean, dwelling, Driveway, W. E. Noffke, architect, Albert Tabbe and E. D. Spence, Builders, $6,000.

Toronto, Ont.

Recent building permits include: H. Franks & Son, 3 att. 2-storey brick dwellings, cor. Paton and Campbell, $5,600; D. B. Cockburn, 1 pr. semi-det. 2-storey brick dwellings, 24-26 Borden street, $7,000; A. F. Aylsworth, 2½-storey brick dwelling, Whitney avenue, $10,000; J. Curry, 2-storey brick addition to apartments, northwest cor. Church and Charles streets, $12,000; F. A. Bowden, 5 att. 2-storey brick dwellings, 649 Logan avenue, $8,000; F. Markham, 1 pr. semi-det. 2½-storey brick dwellings, Balmoral avenue, $5,000; A. Elliott, 1 pr. brick dwellings, 613 Avenue road, $5,000; Crummay & Whalen, 3 att. 3-storey brick dwellings, 61-63-65 Armstrong avenue, $6,000; F. G. McBrien, 3 pr. semi-det. 2¾-storey brick dwellings, Symington avenue, $10,800; Dickson & Turnerm, 3 det. 2-storey and attic brick dwellings, Tyndall avenue, $11,000; W. J. Peppiatt, 3 att. 2½-storey brick veneer front roughcast dwellings, 15-17-19 Salisbury avenue, $5,100; R. H. Bullen, 3-storey brick apartments, 38 Maitland street, $35,000; W. J. Craig, 2-storey and attic brick dwelling, Heath and Russell Hill road, $12,600; Edward Eyre, 1 pr. semi-det. 2-storey and attic brick dwellings, Balmoral, $8,000; C. J. Lakey, 1 pr. semi-det. 2-storey brick dwellings, Lansdowne, $5,000; St. Helen's Parish, 2½-storey brick rectory, north side Dundas street, $20,000; F. Waite, 4 pr. semi-det. 2½-storey brick dwellings, College, $16,000; J. Lancaster & Sons, 5 att. 2-storey and attic brick dwellings, Victor, $5,000; John Poucher, 3 pr. semi-det. 2-storey brick dwellings, Coady avenue, $13,800; L. M. Sinclair, 2½-storey brick dwelling, Warren road, $6,500; C. R Peterkin, Jr., 2 det. 2½-storey brick dwellings, St. Johns road, $5,400; N. Johnson, 1 pr. semi-det. 2½-storey brick dwellings, Medland street, $4,500; E. F. Williams, 3 att. 2-storey and attic brick dwellings, Baker avenue, $5,600; F. S Sneath, 1 pr. semi-det 2½-storey brick dwellings, Crawford street, $4,600; Woodcock & Lock, 1 pr. semi-det. 2-storey brick dwellings, 508-510 Clinton street, $4,500; G. W. Verall, 2-storey [illegible] E. Cornelius, 3-storey brick store and dwelling, 377 Roncesvalles avenue, $5,500; F. G. McBrien, 1 pr. semi-det 2-

(Continued on page [illegible])

Tenders and For Sale Department

Tenders for School Building

Tenders will be received by the undersigned, up to **Monday, the 1st day of May next (1911)**, at 5 o'clock p.m., for building a school house of brick with cement trimmings, on Hickman street, West Highlands, Town of Amherst, according to plans and specifications which may be seen at Town Office, Amherst, and at the office of Leslie R. Fairn, architect, Aylesford, N.S., on and after **Monday, April 17th, instant.** Contractor to do all work and supply all material.

Tenders to be sealed and marked " Tenders for School Building" and must be accompanied with a certified cheque for $500 payable to the Town of Amherst, which amount will be forfeited to the said Town should the party whose tender is accepted neglect or refuse to execute a satisfactory contract to complete the work.

The Town Council do not bind themselves to accept the lowest or any tender.

By order of Town Council
W. FRED DONKIN,
Town Clerk.
Amhert, N.S., April 8, 1911. 15-17

Department of Railways and Canals

Ontario—St. Lawrence Canals

Rapide Flat Canal

Sealed tenders addressed to the undersigned and endorsed "Tender for Improving Lower Extreme to Lock No. 24," will be received at this office until 16 o'clock on **Friday, May 5th.**

Plans, Specifications, and Form of Contract to be entered into can be seen on and after Monday, April 17, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence canals, Cornwall, at which places forms of tender may be obtained.

Parties tendering will be required to accept the fair wage schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $9,000 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES, Secretary.
Department of Railways and Canals,
Ottawa, April 14th, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 17-18

Steam Shovels

We own and have for sale near Buffalo, N.Y., two Vulcan 75-ton 2½-yard steam shovels; late model, with new extra large boilers and in excellent condition; also one 70-ton. These will stand most rigid inspection and we are offering them at unusually low prices. Confer with us.

WILLIS SHAW MACHINERY CO.,
171 La Salle Street,
T.F. Chicago, Ill.

TENDERS
For Waterworks Supplies

The Board of Water Commissioners for the City of London, are inviting tenders for Water Works Supplies for the current year. The list includes Brasswork, Lead Pipe, Iron Pipe, Iron Castings, Stop Cock Boxes, Street Hydrants, Valves, and Valve Chambers.

Tenders will be received up till 12 o'clock noon on **Thursday, April 27th, 1911.**

For information address,
H. J. GLAUBITZ,
General Superintendent.
16-17 London, Ont.

Tenders
For Fire Hall on Balmoral Avenue, Toronto

Bulk tenders, or tenders for the several trades mentioned below in connection with the above building, will be received by registered post only, addressed to the undersigned up to noon on **Tuesday, 9th May, 1911.**

1. Mason work, etc.
2. Carpenter work.
3. Galvanized iron and roofing.
4. Gas fitting and plumbing.
5. Hot water heating.
6. Electric wiring.
7. Plastering.
8. Painting and glazing.

Plans and specifications may be seen and forms of tender and all information obtained at the office of the City Architect, City Hall, Toronto.

Envelopes containing tenders must be plainly marked on the outside as to contents. The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with or tenders may not be entertained.

Tenderers shall submit with their tenders the names of two personal sureties or the bond of a guarantee company.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman Board of Control.
City Hall, Toronto, April, 1911. 17-17

Tenders for Sewers

Sealed tenders addressed to the undersigned will be received up to 4 p.m., **Friday, April 28, 1911,** for the construction complete and supplying of all material necessary of approximately 3,200 lineal feet of Sewers in the Town of Perth. Approximately 3,200 lineal feet of 8-inch pipe and 75 feet of 6-inch pipe. Tenders to state price for excavation and backfilling per cu. yard of earth, hard-pan and rock. The building complete of Catch Basins, Manholes, Lamp Holes, and the laying of and supplying the necessary pipe and Y's.

Tenders must be accompanied by marked cheque for $400.

The lowest or any tender not necessarily accepted. The Corporation reserves the right to withhold from construction the work on any street whereon the residents decline to install water service.

JNO. A. KERR,
Town Clerk.
or
JAS. J. HANDS,
Chairman Sewer Committee.

Department of Railways and Canals

Ontario—St. Lawrence Canals

CORNWALL CANAL

Sealed tenders addressed to the undersigned and endorsed "Tender for Dredging Rapide Plat Canal," will be received at this office until 16 o'clock on **Friday, May 5th.**

Plans, Specifications, and Form of Contract to be entered into can be seen on and after Monday, April 17, at the office of the Chief Engineer of the Department of Railways and Canals, Ottawa, and at the office of the Resident Engineer of the Ontario—St. Lawrence canals, Cornwall, at which place form of tender may be obtained.

Parties tendering will be required to accept the fair wages schedule prepared or to be prepared by the Department of Labor, which schedule will form part of the contract.

Contractors are requested to bear in mind that tenders will not be considered, unless made strictly in accordance with the printed forms, and in the case of firms, unless there are attached the actual signature, the nature of the occupation, and place of residence of each member of the firm.

An accepted bank cheque for the sum of $750 made payable to the order of the Minister of Railways and Canals must accompany each tender, which sum will be forfeited if the party tendering declines entering into contract for the work, at the rates stated in the offer submitted.

The cheque thus sent in will be returned to the respective contractors whose tenders are not accepted.

The cheque of the successful tenderer will be held as security, or part security, for the due fulfilment of the contract to be entered into.

The lowest or any tender not necessarily accepted.

By order,
L. K. JONES, Secretary.
Department of Railways and Canals,
Ottawa, April 14th, 1911.

Newspapers inserting this advertisement without authority from the Department will not be paid for it. 17-18

TENDERS WANTED

Sealed tenders will be received until **Monday, May 8th, noon**, by J. W. Sanders, Town Clerk, Port Hope, for the construction of reinforced concrete girder bridge, superstructure 130 feet long on present piers, and for filling approaches. Plans and specifications may be seen at the Clerk's office, or at the office of the Engineers.

BOWMAN & CONNOR,
17-18 36 Toronto St., Toronto, Ont.

Machinery For Sale

Concrete Plant

Concrete mixer, capacity 60 yards daily.

Concrete mixer, capacity 80 yards daily, with boiler and Lidgerwood hoister complete.

Cube concrete mixer, capacity 90 yards daily, with engine complete.

McKelvey mixer, capacity 75 yards daily, with engine complete.

Foote electric continuous mixer.

About 2,000 feet double track and ties complete, and

Four turntables,
Ten side dump cars,
Three concrete hoisting dump buckets.
Two stone or coal hoisting dump buckets.

NEUCHATEL ASPHALTE CO., LTD.,
17-17 265 Broadway, New York, N.Y.

PORT HOPE

Tenders

For Concrete Sidewalks, etc.

The Corporation of Port Hope invite Tenders for the construction of five lineal miles, or thereabouts, of Concrete Sidewalks and Crossings, with the necessary works connected therewith, in accordance with detail and specifications prepared therefore, copies of which, with forms of tender, may be obtained on application to the undersigned. A marked cheque equal to five per cent. of the gross amount of the contract to be furnished with each tender, and the lowest tender not necessarily accepted. Tenders will be received to noon, **15th May, 1911.**

J. W. SANDERS,
Town Clerk.
Dated 19th April, 1911. 17-19

CITY OF TORONTO

Tenders

For Construction of Ashbridge Bay Docks

Tenders will be received by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, Canada, up to noon on **Tuesday, 23rd May, 1911**, for the construction of dock in Ashbridge Bay.

Envelopes containing tender must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained upon application to the Department of Railways, Bridges and Docks, City Engineer's Office, Toronto.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,
Chairman, Board of Control.
City Hall, Toronto,
April 12th, 1911 17-19

CITY OF SASKATOON

Tenders Wanted for

Excavating and Pipelaying

Sealed tenders, addressed to the City Commissioners, Saskatoon, will be received up to 12 o'clock noon on **Friday, April 28th, 1911**, for all labor necessary for laying about four and one-half miles water mains and sewer mains in the City of Saskatoon, and furnishing certain materials therefor, according to specifications, plans and profiles dated **March 1st, 1911.**

Plans, Specifications, Instruction to Bidders, General Conditions, and Forms of Tender may be seen at the office of George T. Clark, City Engineer, Saskatoon. Instruction to Bidders, and Forms of Tender will be furnished on application but copies of Plans and Specifications will not be furnished.

The lowest or any tender not necessarily accepted.

JAS. CLINSKILL,
W. B. NEIL, City Commissioners.
E. M. SNELL,
Saskatoon, Sask., April 13, 1911. 16-17

EXTENSION OF TIME

City of Edmonton, Alberta

Sealed tenders marked "Tenders for Trunk Sewer," will be received by the City Commissioners up till 3 p.m., **May 15th, 1911**, for the supplying of all materials and the construction, in tunnel of a concrete sewer ten feet six inches (10 ft. 6 in.), in internal diameter and approximately 3,290 feet long.

Plans and specifications and all particulars may be obtained from the City Engineer's office, Edmonton, on deposit of a marked cheque for the sum of $25.00, which will be held until the return of plans and specifications. Duplicates of which may be seen at the office of the Contract Record, B34 Board of Trade Building, Montreal, Que.

Lowest or any tender not necessarily accepted.

CITY COMMISSIONERS.
A. J. LATORNELL,
City Engineer,
Edmonton, Alta. 14-16

Previously advertised for May 2nd, 1911.

Temiskaming and Northern Ontario Railway Commission

Sealed tender, addressed to the undersigned, will be received up to 12 o'clock noon, on **Wednesday, May 3rd**, for all works in connection with the construction of a passenger station at Matheson. Tenders to be marked on envelope "Passenger Station at Matheson."

Plans and specifications may be seen at the office of the Architect, J. M. Lyle, 14 Leader Lane, Toronto, or at the office of the Chief Engineer in North Bay.

Certified cheque on a chartered bank of Canada, payable to the order of the Secretary-Treasurer of the Commission, for 10 per cent. of the amount of the tender, must accompany same.

The lowest or any tender not necessarily accepted.

A. J. McGEE, Sec.-Treas.
25 Toronto Street, Toronto.

Toronto, April 12th, 1911.

Note—Papers inserting this advertisement without authority will not be paid for it. 16-17

City of Prince Albert, Sask.

Tenders for

Electrical Machinery

Sealed tenders addressed to the City Commissioners, and marked "Tenders for Electrical Machinery," will be received until Wednesday, May 31st, 1911, for the following,

A.—One 100 h.p. Cross Compound Engine with necessary condensing apparatus, steam piping, installed complete.

Tenders on Engine of the following classes will be considered:

(1) Horizontal Cross Compound Corliss Engine, 125-150 r.p.m.

(2) Vertical Cross Compound Corliss Engine, 125-150 r.p.m.

(3) Vertical Cross Compound Quick Revolution Engine, Forced Lubrication.

B.—600 k.w. 2,200 volt, 60 cycles, 3-phase Engine Type Alternator, Exciter, Switchboards, Automatic Regulator, installed complete.

C.—72 in. x 18 ft. Return Tubular Boiler, suitable for 150 lbs. working steam pressure.

Specifications will be furnished on application to the City Commissioners, or R. Wright, City Electrician.

The lowest or any tender not necessarily accepted.

ANDREW HOLMES,
C. C. DAVIDSON, City Commissioners.
D. A. CRE[illegible]TON, 17-18

CITY OF REGINA

Saskatchewan, Canada

Tenders for Sewage Pumps and Motor. Switchboard and Apparatus. For Sewage Disposal Works.

Sealed tenders marked "Tenders for Sewage Pumps, Disposal Works," will be received by the City Commissioners, Regina, until 12 o'clock noon, **April 30th, 1911**, for the supply of One 1,000,000 gallons per 24 hours capacity Pump and Motor. Switchboard and Apparatus.

Full particulars may be had upon application to the Chief Engineer, Trunk Sewer Works.

The lowest or any tender not necessarily accepted.

(Signed) JOHN MARSHALL,
Chief Engineer,
Trunk Sewer Works
April 6th, 1911. 15-17

City of Winnipeg Electrical Distribution System

Tenders

For 500 K. W. Transformers

[illegible] formers," will be received at the office of the undersigned up to 11 a.m., on **Monday, May 15th, 1911** [illegible] stallation of six (6) 500 k.w. Step-down Trans- [illegible] any bid which appears advantageous to the City of Winnipeg.

[illegible]

Winnipeg, April 20th, 1911. 17-17

Tenders for Steel Bridge

Tenders will be received by the undersigned up to 4 p.m., on **Tuesday, May 16th, 1911,** for the erection of a Warren Truss Steel Bridge, over [illegible] at [illegible], 5 miles north of [illegible]. Span [illegible] centre to centre of bearings, 14 ft. roadway, concrete floor.

Plans and specifications may be seen at my office, Walkerton. Tenders will be opened on Wednesday, May 17th, at 2 p.m., at Queen's Hotel, Port Elgin.

Also tenders received for the erection of two concrete abutments for said bridge.

The lowest or any tender not necessarily accepted.

JAMES WARREN,
Engineer.

Walkerton, April 22, 1911 17-18

Corporation of the Town of Collingwood

Tenders will be received by the undersigned until 2 o'clock p.m., **May 3rd, 1911,** for the following:

Approximately 11,266 square yards of Bituminous Pavement on a five-inch concrete foundation.

Approyimately 9,504 lin. feet of concrete curb.

Approximately 9,504 lin. feet of sixteen inch concrete gutter.

All tenders must be accompanied by an accepted cheque for the sum of Two hundred dollars made payable to the Town Treasurer, same to be forfeited to the Corporation if the party tendering declines entering into the contract for the work, at the rates stated in the offer submitted. All tenders must be sealed and sent by registered mail and marked "Tender for Bituminous Paving." For further information apply to the office of the Town Engineer.

The lowest or any tender not necessarily accepted.

K. S. MACDONELL,
Town Engineer.

Collingwood, Ont.
April 12th, 1911. 16-17

Notice to Contractors

MAIN DRAINAGE WORKS

Pumps, vertical electrically driven.
Motors and other electrical equipment.
Screens and cleaning apparatus.
Venturi Meters.

Sealed tenders addressed to the Chairman of the Board of Control, City Hall, will be received by registered post only, up to noon of **June 6th, 1911,** for the supply of the above equipment.

Envelopes containing tenders must be plainly marked on the outside as to contents.

Specifications and forms of tender may be obtained at the office of the City Engineer, Toronto.

The tenderers shall submit with their tender the names of two personal sureties (approved of by the City Treasurer) not members of the City Council, or Officers of the Corporation of the City of Toronto, or, in lieu of said sureties, the bond of a Guarantee Company, approved as

The usual conditions relating to tendering as prescribed by city by-law must be strictly complied with, or the tenders will not be entertained.

The lowest or any tender not necessarily accepted.

G. R. GEARY, Mayor,

17-17 Chairman, Board of Control.

Miscellaneous

Advertisements under this heading two cents per word per insertion.

Large European concern manufacturing water turbines, centrifugal pumps and steam turbines, wants to be represented in Winnipeg and Vancouver by well-known qualified and experienced firm. Box 265, Contract Record, Toronto, Ont.

Miscellaneous

(Continued from page 57)

storey brick dwellings, cor. Royce and Osler avenue, $4,600; P. H. Stewart, 1 pr. semi-det. 2-storey and attic brick dwellings, Lansdowne avenue, $4,800; H. J. Rea, 2-storey and attic brick dwelling, St. Andrews Gardens, $4,500; Robinson & Shelley, 2 pr. semi-det. 2-storey roughcast dwellings, brick fronts, east side Greenwood, near Gerrard, $4,800.

Vancouver, B.C.

The following contracts for improvements will be carried out by C. P. R.: The complete fire protection system for the False Creek freight yards, involving among other things the installation of a pipe line for the full length of the freight sheds with hydrants at convenient points, will be put in by Mr. J. H. Vickers of this city. The contracts for the erection of the new ten-stall addition to the round house, and the pattern house in the False Creek yard have been given to the Canadian Dart Company, of Vancouver. Campbell & Wilkie, of this city, will construct the new freight sheds at Harrison Mills, Walhachin and Savonas as well as the boiler house for the large and new oil tanks now being erected near the C. P. R. wharves here. Mr. A. D. McQuarrie, of Vancouver, will build the new Abbotsford station; the addition to the depot building at New Westminster will be put up by Mr. C. Tossell, of this city, while the freight shed at Merritt is to be constructed by Mr. John Boch, of Merritt.

Windsor, Ont.

Windsor is considering a proposition to spend $17,000 in overhauling its fire fighting system. The plan is to purchase two pieces of motor-driven apparatus, including a combination truck and fire engine, as a first step toward converting the entire department into an automobile force.

AWARDED

Collingwood, Ont.

The following contracts for school were awarded: J. S. Woolum, Collingwood, for mason work, carpenter work, plastering, painting and graining, $20,741; Wm. Parrott, for plumbing, heating and roofing, $6,618; total, $27,359. John Wilson, architect.

London, Ont.

The contracts for pit gravel were awarded as follows: Section 1, R. Hutchinson, $2.40; 2, W. J. Boss, $3; 3, R. Hutchinson, $3.20; 4, Geo. Alexander, $3.50; 5, R. Robinson, $3.20; 6, G. Alexander, $3.40; 7, R. Hutchinson, $2.80; 8, J. Quick, $3.24. Mr. J. Flood was awarded the contract for hauling broken stone at 35 cents a load. Mr. W. J. Boss was given the contract for supplying broken stone at $1.70 a load.

Business Notes

A. & R. Billet, contractors, Montreal, Que., have registered.

The Hull Woodenware Co., Ltd., Hull, Que., assets to be sold by tender.

J. Barrette & Cie., plumbers, Montreal, Que., are stated to have dissolved.

Therriault & Malette, plumbers, Montreal, Que., are stated to have dissolved.

Simoneau & Bastien, waterworks, Racine, Que., have registered.

Heon, Roy & McLeod, contractors, Three Rivers, Que., have registered.

Naylor, Son & Co., Essex, Ont., Ont., electric light plant sold to Essex Light & Power Co., Ltd.

David Steven, saw mill proprietor, Chesley, Ont., is stated to have assigned to Matthew A. Halliday.

M. Germain & Co., plumbers, St. Roumald, Que., are stated to have assigned.

Morden Pump & Machine Works, Morden, Man., are stated to have dissolved.

H. E. Brunet & Cie., bricklayer contractors, Montreal, Que., have filed consent of assignment.

Lincoln Saw Mills Co., Ltd., sawmill proprietors, Langley Prairie, B.C., are stated to have assigned.

Similkameen Co., Ltd., sawmill proprietors, Princeton, B.C., is stated to have sold out to W. C. McDougall.

The Laing-Ritchie Co., of Essex, Ltd., Essex, Ont. Planing mill and lumber business taken over by the Naylor Lumber Company.

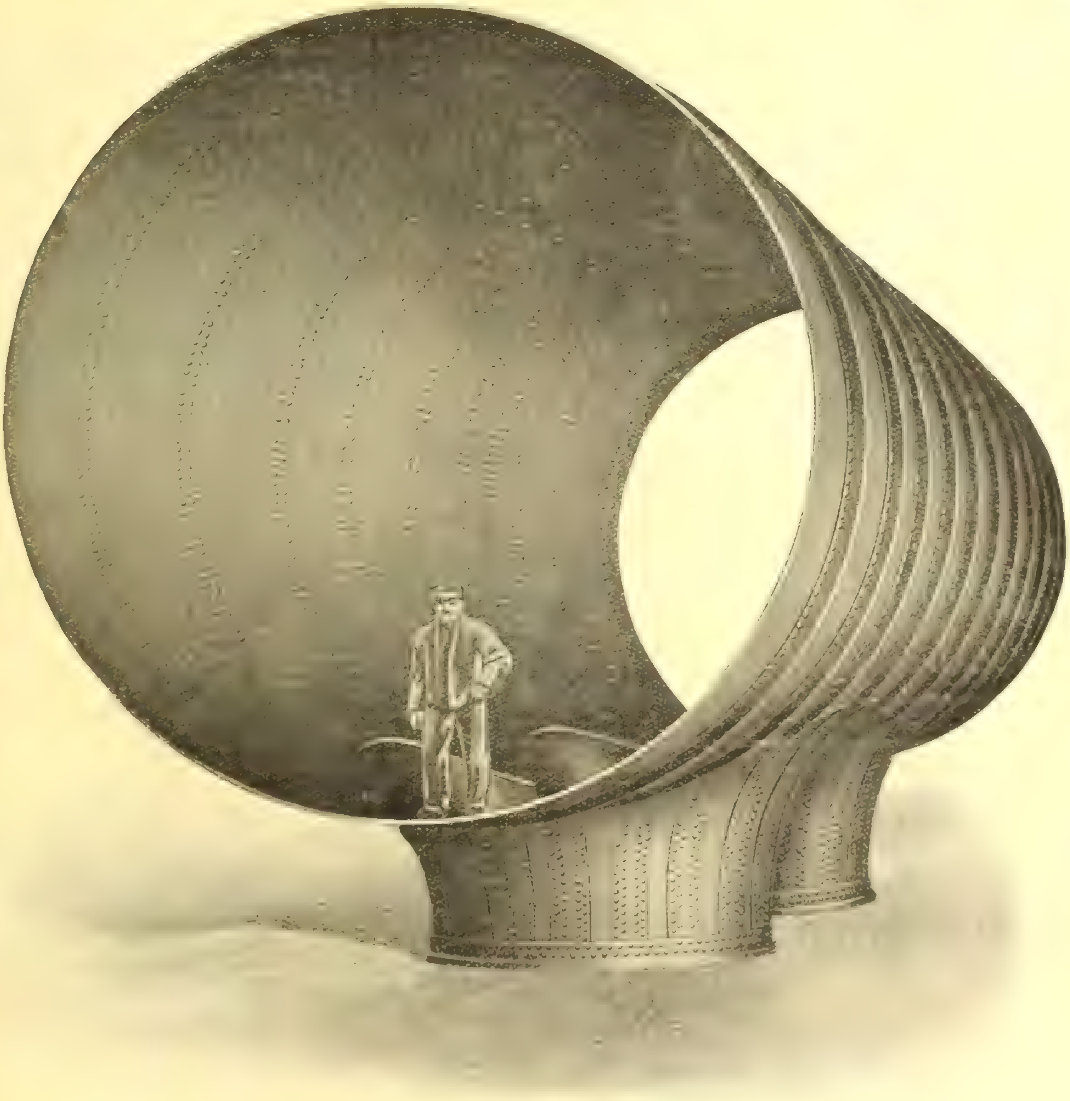
A report has been prepared at the City Hall showing that there are at present 91,160 houses in Montreal as compared with 64,500 in 1906, or an increase of nearly 30,000 new residences in five years.

The power plant of the Sherbrooke Railway & Power Company has been completed and is in operation. At a meeting of the directors held in Montreal a few days ago it was stated that the company's railway line would be started at once and it is hoped to have it running by the first of July.

Mr. J. C. Wallace, of the Western Dry Dock and Shipbuilding Company, Port Arthur, stated on the 20th that work would be started at once on the construction of the largest boiler works in the Dominion of Canada. The produce of the factory would be steam boilers of all kinds, stationary, marine, and locomotive, stationary engines, pumps, and other lines of machinery. No estimate has been furnished yet as to the approximate cost of this plant.

The C. P. R. has placed an order at the Angus shops for six new sleeping cars of a distinctly new type. These are for the Imperial Limited, each car will have seven state rooms together with all modern conveniences, placed in the most approved form. Each drawing room will accommodate five persons and be finished in different styles of decoration. Every compartement will be furnished with individual electric lights and the dusting will be done by an adaptation of the vacuum cleaner system.

PENSTOCKS



Side view of Penstock Distributor built for the Ontario Power Co.

We would be glad to hear from those who have Heavy Plate work of any kind to build and especially American Companies who are contemplating the erection of Penstocks or Heavy Plate work of any description in Canada. We are specially equipped for this work.

Write us for particulars

The John Inglis Company Limited

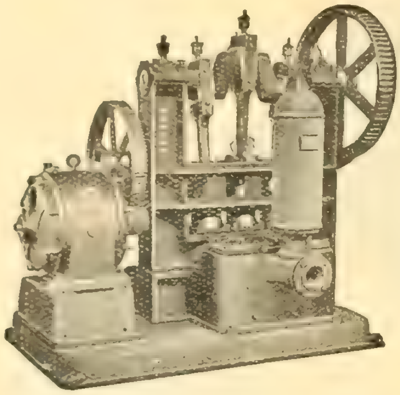
Engineers and Boilermakers

14 Strachan Ave. TORONTO, Canada

Goulds Efficient Power Pumps

Built in the best manner and of material that can be depended upon. They will be found to fully sustain the high reputation of

GOULDS QUALITY



Goulds Pump Co.

Coristine Building, **Montreal**

Phone Main 1054

Works: Seneca Falls, N.Y.

The Consolidated Stone Company

Quarries and Mills at Bedford, Indiana, and Bloomington, Indiana

Producers of Dark Hollow Buff and Blue
Hunter Buff and Blue Oolitic Limestone

The Celebrated

Bedford Stone

from our quarries has been used in many of the largest public buildings, churches, etc., in the United States and Canada.

Mill blocks, sawed, planed and turned stone of every description furnished on short notice. Write for information.

General Offices
324-327 Monadnock Block - Chicago, Ill.

Toronto Agent
A. P. STEWARD - Builders' Exchange

(Continued from page 50.)

Association, and Association of American Portland Cement Manufacturers. The Blue Book presents data especially applicable to Pittsburg Standardized Reinforcement and other information useful in general design. The Pittsburg Standardized Reinforcement offers an efficient system of design requiring practically no drafting details, and the Blue Book reduces the amount of mathematical computations to a minimum.

The publishers of the "Cement Era," Chicago, have issued their fifth annual Directory of Portland Cement Manufacturers. In the compilation of this directory every care has been taken to make it accurate, complete and up-to-date. It contains a complete list of manufacturers of cement, gypsum and lime, as well as machinery and supply firms. The lists given should be most useful in the conduct of all businesses relating to the cement and allied industries.

C. P. R. Programme for 1911

The programme of the Canadian Pacific Railway in western Canada for 1911 includes the construction of 380 miles of new branch lines and the building of 100 miles of double trac. The most easterly portion will be that between Fort William and Port Arthur. In Manitoba the work will be continued to Brandon. In Saskatchewan double track will be built both east and west from Moose Jaw. East of Moose Jaw congestion is caused, owing to trains from the Soo line running on the main line at Pasqua, 7 miles from Moose Jaw, but this difficulty will be overcome by the construction of the double track between the two points. The same congestion would occur in future years west of Moose Jaw through the construction of the new branch line to the southwest. To avoid this, and to provide better facilities, the company will this year double-track the line for a distance of 16 miles west of Moose Jaw.

The addition of 40 miles to existing sidings will be made to make room for the longer trains drawn by mogul engines, and the Winnipeg shops of the company will be enlarged to provide facilities for the handling of locomotives and cars.

The Manitoba and Northwestern line running through Yorkton will in future years be the main road from Winnipeg to Edmonton. The steel on this line is light, but this summer heavy 85-pound steel will be laid for 158 miles, and much ballasting, etc., will be done, making the roadbed capable of carrying the heaviest trains at the highest speed.

Rock-crushing plants will be built in British Columbia, and hundreds of miles of roadbed will be ballasted to protect it against the effects of heavy rains.

The Canadian Pacific Railway propose to extend Granville street through the existing depot in Vancouver city, and construct a jetty to accommodate three Pacific steamers; also extensive improvements will be made on False Creek and Burrard Inlet. The company will also establish the gravity system for the distribution of cars at the Fort William terminals, in place of the poling yard, and will replace existing steel bridges with heavier ones, capable of carrying the largest locomotives. New railway yards are to be established at Medicine Hat, Moose Jaw and Regina.

The new lines for the western Provinces will be from Moose Jaw, southwest, 35 miles; Estevan to Forward, 35 miles; Weyburn extension, 20 miles; from Swift Current, southeast, 45 miles; Swift Current, northwest, 35 miles; Wilkie, south on the east side of Tramping Lake, 25 miles; Wilkie, northwest through the Cut Knife country, 32 miles; the Lacombe branch eastward, 60 miles; from Golden, south (Kootenay Central), 20 miles; and Carmangay to Aledrsyde (southern Alberta), 27 miles.

Notable Crushing Plant

DESIGNED AND ERECTED BY US

View No. 6

Of Laurin and Leitch's plant, Montreal, shows 4 No. 6 Crushers on one floor fed through the bin from screens shown on floor above last week. These crushers have a capacity of 280 tons of rock 2½ ins. or smaller per hour. The flexibility and capacity of the plant is

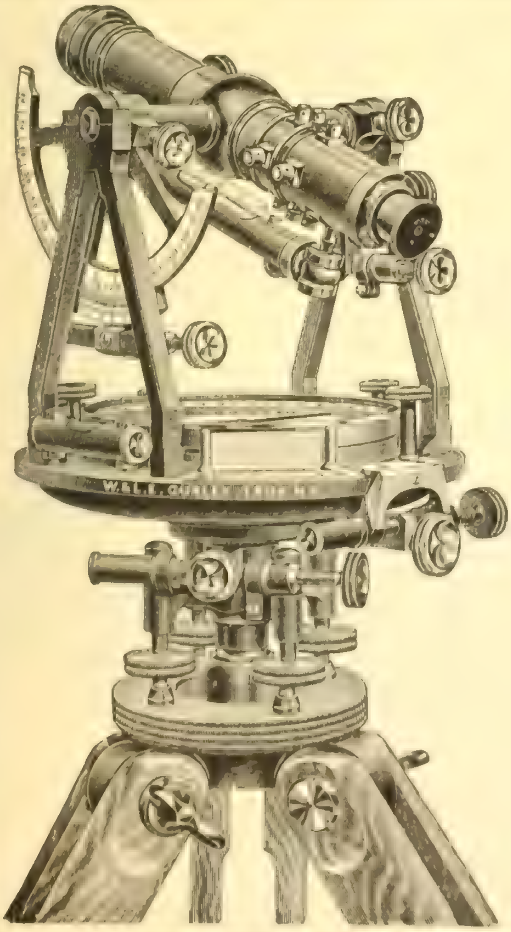
Unequalled in Canada

Any or all of the smaller crushers may be cut out temporarily. One side of the big No. 21 Crusher shown in view No. 3, April 5, with its elevator and screen can be operated without the other

For further information write our sales offices: Montreal, Toronto, Cobalt, Winnipeg, Calgary, Vancouver.

Allis-Chalmers-Bullock

LIMITED



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Largest Manufacturers in America of

Field Instruments

for Civil, Mining and Hydraulic Engineers and Land Surveyors

Transits
Y Levels
Compasses
Plane Tables

Current Meters
Levelling Rods
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Tape Lines

Also Makers of

Physical and Scientific Laboratory Apparatus
Standard Weights and Measures
Accurate Mercurial Thermometers

Branch Factory: Manufacturers Exchange Building Seattle, Wash.

Latest edition of Gurley's Manual sent on Application.

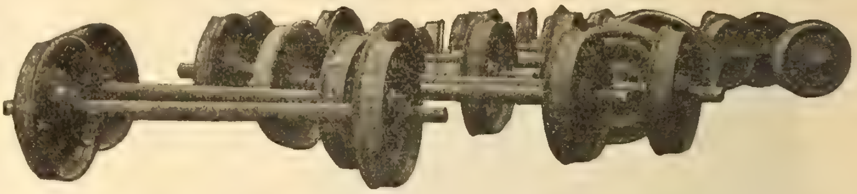
RAILWAY CONSTRUCTION PLANT

Hoisting Engines, Horse Powers, Hand Winches, Derricks, Car Wheels, Axles and Boxes, Dump Cars, Rail Cars, Buckets

MARSH & HENTHORN, Limited
Makers of Hoisting Machinery, BELLEVILLE, ONT.

Send for Catalogue

SALES AGENTS
MUSSENS
LIMITED
Montreal, Que.



Toronto Pressed Brick and Terra Cotta Works

BRICKS

ROOFING AND FLOORING TILE, CRESTINGS, FINIALS AND CHIMNEY TOPS

Send for Samples and Prices. Special and prompt attention given to Architects' Terra Cotta Drawings

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Head Office - - MILTON, ONT.

C. J. LEWIS, Proprietor

Montreal Agent: E. F. DARTNELL, 157 St. James St. Toronto Agent: J. D. MacDONELL, 19 Yonge St. Arcade

Dundas Stone

All Sizes—For Concrete, Road Work and Sidewalks.

Flux Stone

Doolittle & Wilcox, Limited
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ORNAMENTAL IRON WORK WIRE CLOTH AND WIRE GOODS

Perforated Metal
Concrete Reinforcement
In Rolls, Lengths or Sheets

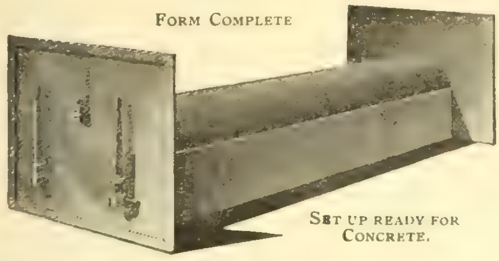
WE SOLICIT YOUR ENQUIRIES

Canada Wire Goods Mfg. Co.
HAMILTON, ONT.

COLLAPSIBLE STEEL FORMS

For the Building of

Culverts, Conduits, Small Bridges, Sewers, Etc.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SET UP READY FOR CONCRETE.

Our Collapsible Steel Forms are the lightest, strongest and most durable made. They combine in the simplest way every requirement for rapid and practical work, and are attracting wide attention. They are highly endorsed by road and street officials, contractors and engineers everywhere.

WRITE FOR FORM CATALOGUE
ENGINE CATALOGUE FOR THE ASKING
COMMISSIONER'S TIME BOOK FREE

Concrete Form & Engine Co.

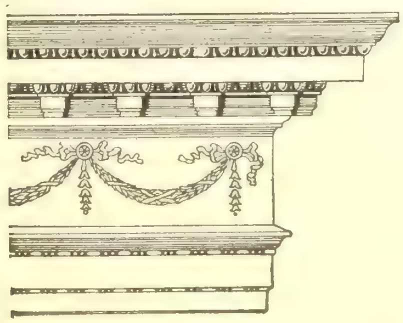
Successor to Collapsible Steel Form Co.

83 Congress St., W., Detroit, Mich.

A good appearance is a letter of recommendation a house well built, a monument to the builder."

Superior Quality Material and Workmanship Count

Metallic Cornices



are the MOST ARTISTIC, MOST DURABLE and MOST EASILY ERECTED cornices you can place on any building.
They are made of sheet copper or galvanized steel and are absolutely rust proof.
"Metallic" cornices can be furnished in any design desired to suit your drawings and specifications.
Let us give you prices and full information--send us your specifications Our catalogue of sheet metal building materials, No. 70, will interest you. Write for it.

Manufacturers 1951

The Metallic Roofing Co Limited
TORONTO & WINNIPEG

Neptune Meter Co.

Manufacturers of the well-known

TRIDENT Frost-Proof Water Meters

Write for Catalogue

Main Office - 90 West Street
New York City

Bryan for Doors

We manufacture a line of high class doors for all parts of house finish. Our interior trim and fine interior hardwoods will give the building they are put into an artistic finish.

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The
BRYAN
Manufacturing Co.
Limited
Collingwood, Ontario

Orleans Filtration Plant and Concrete Building taking about 100,000 barrels of Alsen's New Cement

Alsen's Cement

was selected in 1905 for the Panama Canal in preference at equal prices and has exceeded those severe requirements. Sold under a guarantee other Portlands cannot make in good faith. Other brands have been supplied only on modified specifications.

Alsen's American Portland Cement Works
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LIMITED
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'Water-washed' & Gravel

Crushed Granite
Crushed Stone

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Interior Finish
in
Birch, Mahogany, Plain Oak, Quartered Oak, Cypress, etc.
Sash, Doors, Porch Columns, Store Fronts, Mouldings, etc.

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Manufacturers of Fine Woodwork
Kingston, Ontario

"The best is cheapest"

"Sanorto"
Composition Flooring

Guaranteed durable, jointless, noiseless; fire, water, insect and dust proof
For Churches, Hospitals, Hotels and all public buildings it is unequalled. Its use in private houses for bath rooms, kitchens, verandahs, etc. has always given the greatest satisfaction.
Our imitation marble is perfect. Testimonials on application Estimates on all classes of work free. Distance no object. Write for samples

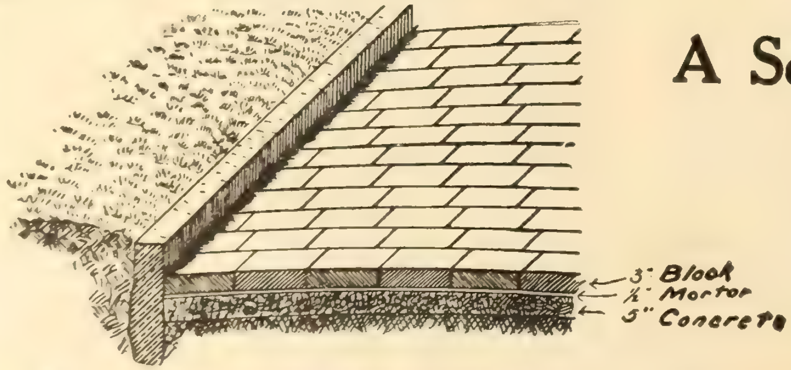
The Sanitary Floor Co.
544-546 King Street West. - - Toronto, Ont.

EVERYTHING YOU WANT
in a Factory Site:

Water, drains, sidewalks, gas, electric power, tramways, three railways, police and fire protection and all Montreal's facilities

at

Maisonneuve, Que.



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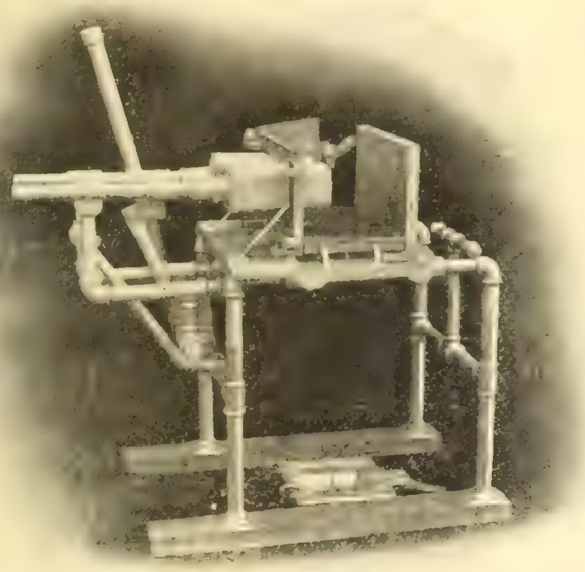
must be
Durable and Non-Abrasive.
Non-Absorbent and nearly Noiseless.
Unaffected by extremes of Temperature.
Sightly and Sanitary.
Easily Repaired and Easily Cleaned.

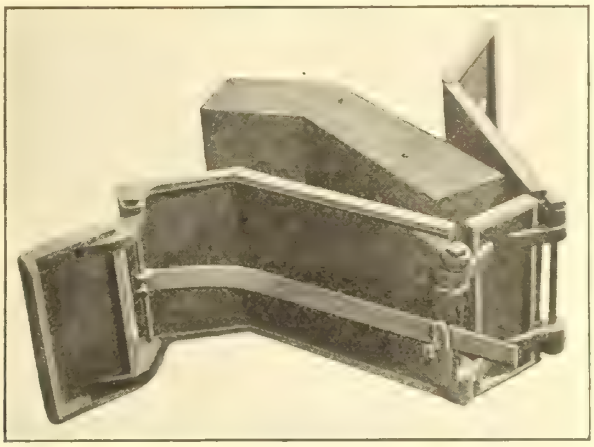
These requirements are met by
Asphalt Block Pavements
Send for Descriptive Literature

The Ontario Asphalt Block Company, Limited - Windsor, Ont.



Block Machine No. I. (**End Door Removed**)

This machine is strong, simple, and what is more important it is the fastest outfit on the market, and you know time means money.



Famous Angle Mould

This mould will make blocks with any angle from 20 to 60 degrees in 8 or 9 inch height without having to change any parts other than for adjustment. A great many of these moulds have been sold.

Send for our Literature

Famous Machinery Co.,

21 Pitt Street W.
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Architects engaged in planning fire-proof buildings will do well to specify

GREENING'S

Patent Trussed Hard Steel Wire Lathing

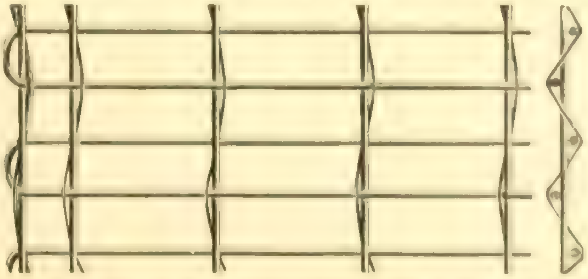
Supplied in continuous lengths up to 100 yards with selvage on each side, and in widths to suit the spacing of studs or joists. It presents to the plasterer's trowel a much greater resistance, and the plaster seizes more quickly than on any other wire fabric so far introduced.

In handling our trussed lathing there is practically no danger of cutting or scratching the hands, and selvages are stapled or nailed directly along studs or joists without furring.

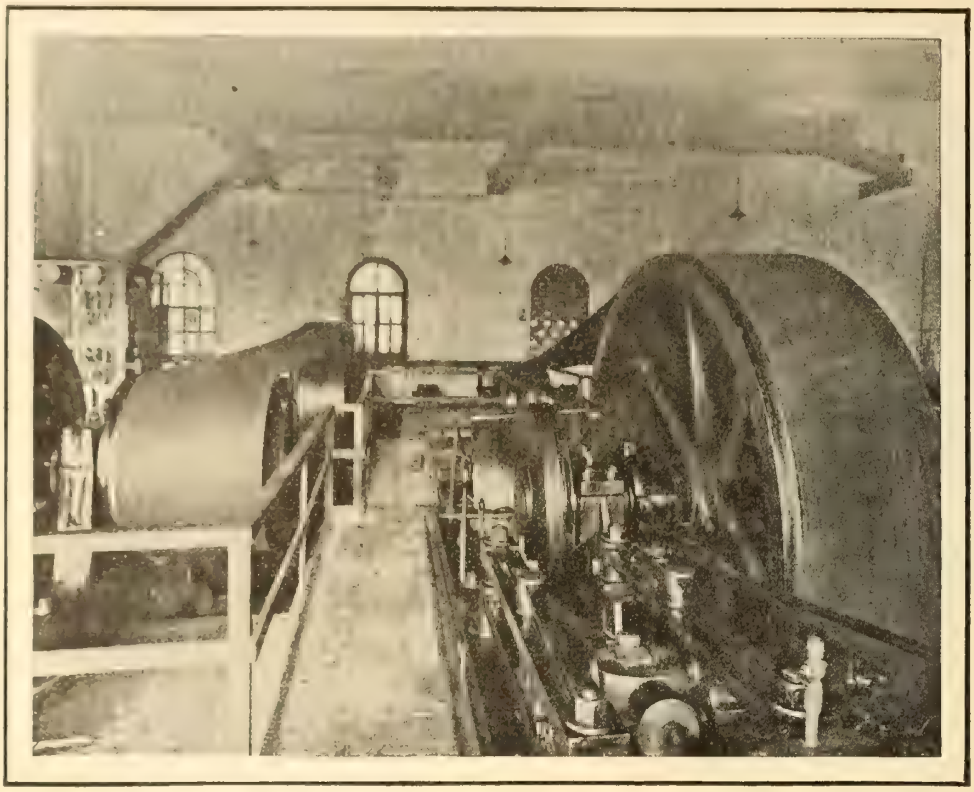
Our Trussed Lathing adapts itself to any desired curve, and takes bends of sharp corners without requiring to be cut.

Write for Catalogue No. 5 and further details.

The
B. Greening
Wire Co.
Limited



Hamilton
Ont.
Montreal
Que.



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Limited

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MONTREAL

SCANDINAVIA BELTING

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STONE of any Size and in any Quantity on hand for Sidewalks, Roadwork or Concrete Work

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Phone Main 4516

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Executive Office :
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Toronto General Trust Building TORONTO

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Taylor, Hogle & Davis
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Merriman One-Car Asphalt Plant

The only portable plant that melts asphalt with steam: no coking or burning of asphalt as with direct heat. Capacity 1800 yds. two inch top; or 4000 yds. one-inch binder in ten hours.

Many special features. Write for full particulars.

Also Asphalt Mixers

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ENGINES and BOILERS of all types and sizes, Heaters, Tanks, Pumps etc

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Agents for National Gas Engine Co. - Browett-Lindley Vertical Engines

Established 1882

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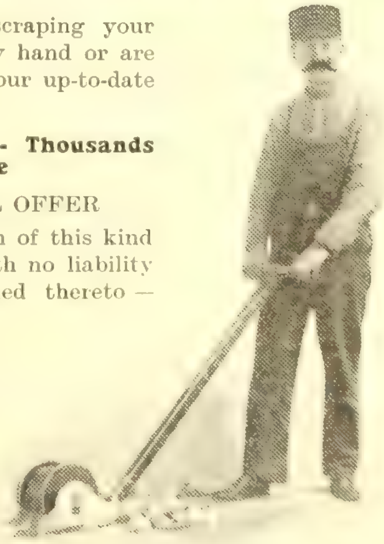

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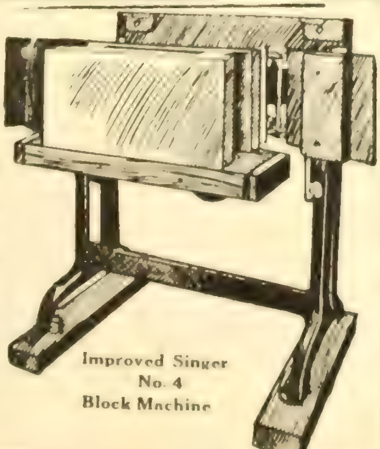

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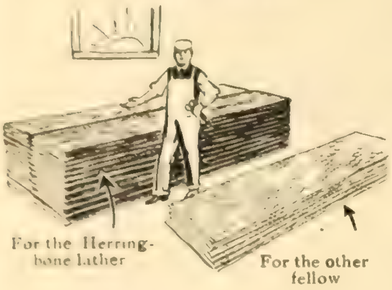

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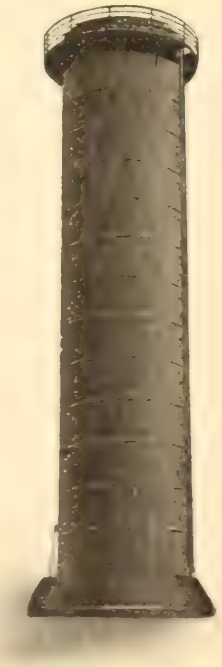

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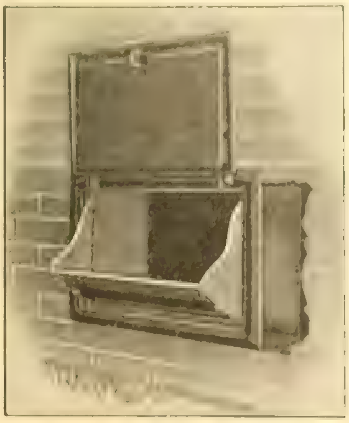

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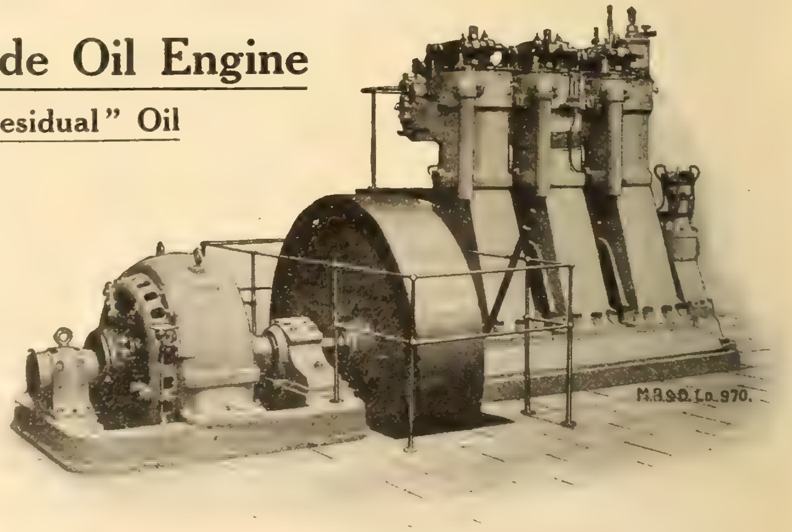

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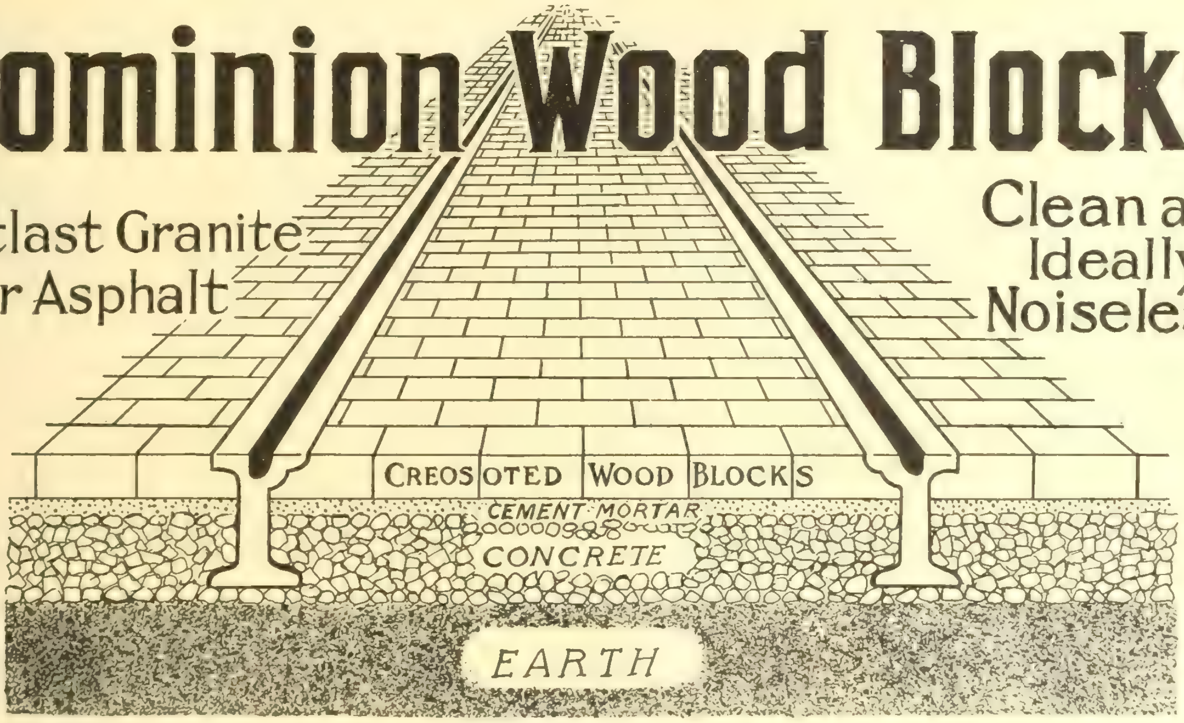

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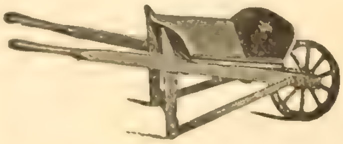

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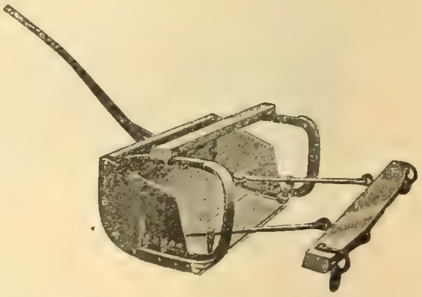

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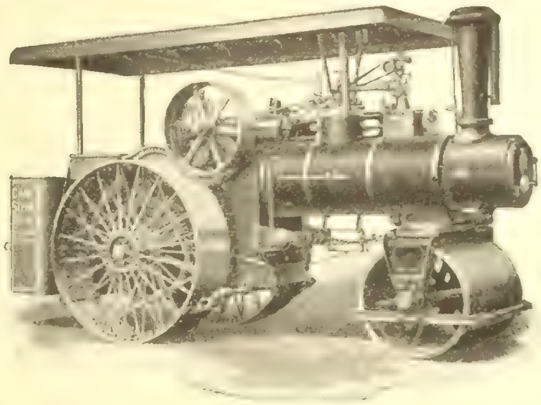

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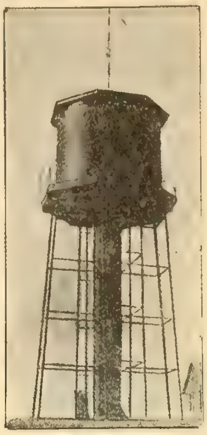

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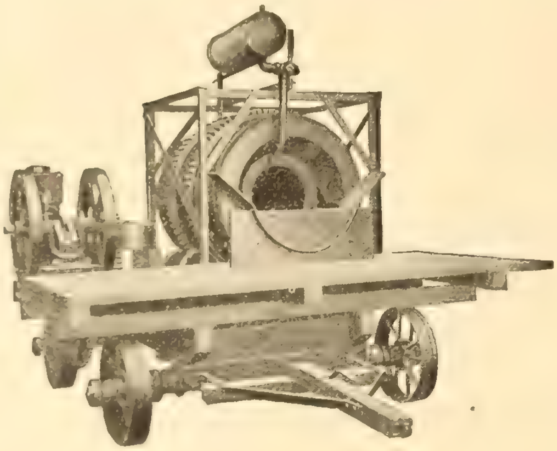

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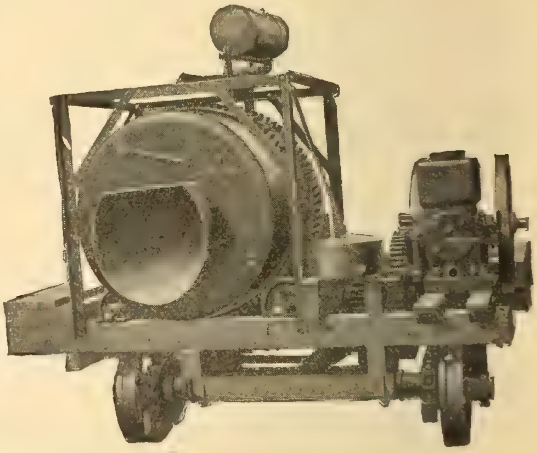

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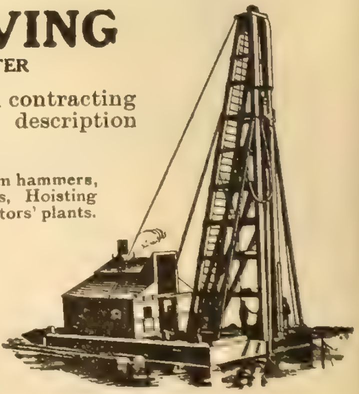

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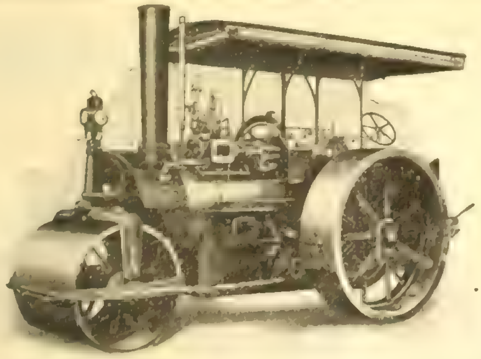

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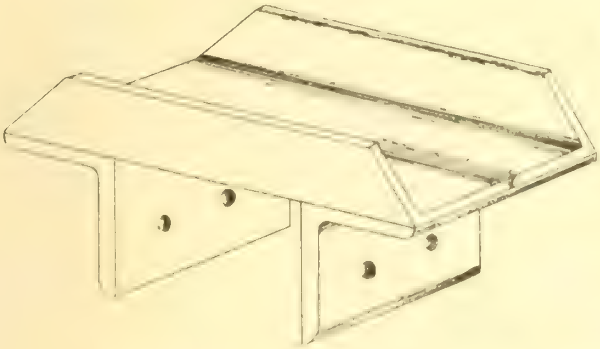

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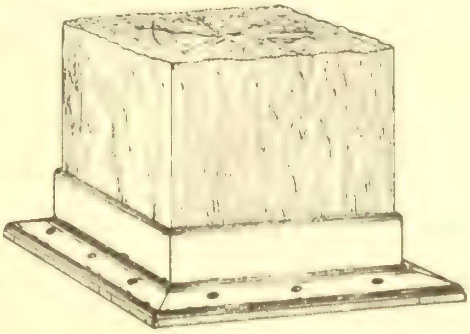

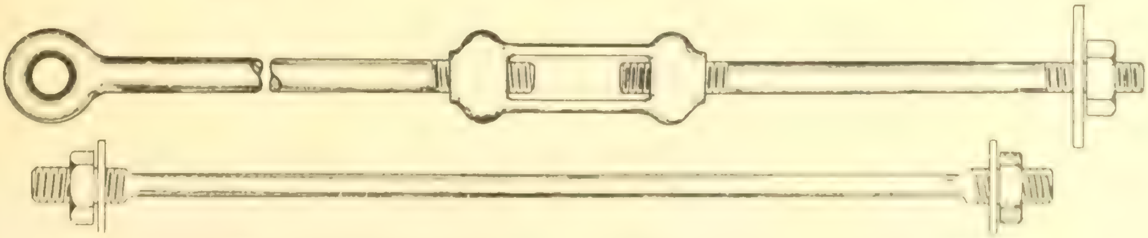

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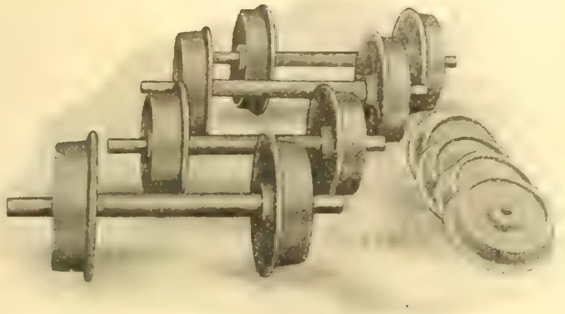

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The following are wholesale prices delivered at Toronto:—

	Per B.
No. 1 dry pressed red brick	$18.00
No. 1 dry pressed buff brick	18.00
Red Stock Bricks	12.00
Grey Stock Bricks	11.00
Wire cut bricks for foundation work	11.00
Porous terra cotta bricks	15.00
No. 1 enamelled bricks, all colors, from	$80.00 to $150.00

WINDOW GLASS.

Following are the prices of glass at Toronto, Hamilton and London. These prices are f.o.b., with 30 and 5 per cent. off for wholesale:—

	Star.	D.D.
10 to 25 united inches	$4.25	$ 6.25
26 to 40 "	4.65	6.75
41 to 50 "	5.10	7.50
51 to 60 "	5.85	8.50
61 to 70 "	5.75	9.75
71 to 80 "	6.25	11.00
81 to 85 "	7.00	12.50
86 to 90 "	...	15.00
91 to 95 "	...	17.50
Brass Goods, Valves, etc.		
96 to 100 "	...	20.50
101 to 105 "	...	24.00
106 to 110 "	...	27.50

The following are wholesale prices for glass at Montreal and jobbing prices at Winnipeg for box lots:—

	Single		Double	
	Mont'l.	W'p'g.	Mont'l.	W'p'g.
25 u. i.	$4.00	$3.00	$ 6.75	$ 5.25
40 u. i.	4.25	3.50	6.75	5.50
50 u. i.	4.75	4.25	8.75	6.50
60 u. i.	5.00	4.75	10.00	7.50
70 u. i.	5.25	5.25	11.50	8.50
80 u. i.	5.75	6.00	12.50	9.50
85 u. i.	...	...	14.00	10.50
90 u. i.	...	...	16.50	11.50
95 u. i.	...	...	18.00	13.50
100 u. i.	...	...	20.00	16.00

50-foot boxes at Montreal, 25-inch Break, $2.10; 40-inch Break, $2.20. Montreal discounts—Single, 25 and 5 per cent. off; D. D., 40 and 10 per cent. off. Winnipeg prices are net.

BUILDING TILES.

(Installed in Toronto.)

Floor Tile—Ceramic, any color, ¾-inch square, 1-inch hex., and 3-16-inch round, 55 cents per square foot up.

Floor Tile—⅛-inch square, 65 cents.

Wall Tile—Rock faced, sizes 6 x 2 inch, 2 x 2 inch; colors, buff, grey, granite, red granite, 55 cents per square foot.

Vitreous Tile—All sizes, according to color, 55 to 65 cents.

Glazed—White, 6 x 8 inches, 55 cents per square foot.

Matt—Dull finish colors, first, 70 cents.

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Opalite Tile—3-16 inch No. 1 standard, size 6 x 8 inches, 6 x 2 inches, 60 cents.

White glass, installed, 6 x 8 inches, 30 cents.

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Standard compression work, 65 per cent.

High grade compression work, 60 per cent.

Fuller work, 70 per cent.; No. 0, 75 per cent., and 1 and 2 basin cocks, 70 per cent.

Flatway stop and stop and waste cocks, 70 per cent.; roundway, 65 per cent.

No. 4 compression bath cock	net $1.65
No. 4½ Fuller's	net 2.25

Square head brass cocks, 65; iron, 65 per cent.

Heating Apparatus.

Hot water boilers, 50 and 10 per cent.; hot water radiators, 50 and 10 per cent.; steam radiators, 50, 10 and 2½ per cent.; wall radiators, 50 and 10 per cent.; specials, such as angles, curves, etc., 25 per cent.

Boilers—Galvanized Iron Range.

30 gallon, standard, $4.50; extra heavy, $7.00

Cast Iron Sinks.

16 x 24, $1.00; 18 x 30, $1.15; 18 x 36, $1.95

Lead Pipe.

Lead pipe, 30 per cent. off; lead waste, 30 per cent. off; caulking lead, 4½ cents per lb.; traps and bends, 60 per cent.

Iron Pipe.

(per 100 ft.)	Black.		Galvanized.
¼ inch	$ 2.03	¼ inch	$ 2.86
⅜ inch	2.25	⅜ inch	3.08
½ inch	2.63	½ inch	3.48
¾ inch	3.28	¾ inch	4.43
1 inch	4.70	1 inch	6.35
1¼ inch	6.41	1¼ inch	8.66
1½ inch	7.70	1½ inch	10.40
2 inch	10.26	2 inch	13.86
2½ inch	16.39	2½ inch	22.14
3 inch	21.52	3 inch	29.07
3½ inch	27.08	3½ inch	36.58
4 inch	30.78	4 inch	41.58

Malleable Fittings—Canadian discount, 37½ per cent.

Cast iron fittings, 65; headers, 65; flanged unions, 65; malleable bushings, 65; nipples, 4-inch diameter and under, 75 and 10; nipples, 4½-inch and up, 70; malleable lipped unions, 65 per cent.

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Medium and extra heavy pipe and fittings, up to 6-inch, 75 per cent.

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Binder stone, $1.35 per ton, f.o.b. Toronto.

Burnt River rubble stone delivered, $15 to $16 per toise.

Free stone delivered, $15 to $16 per toise.

Brown coursing stone, delivered, $3.25 to $3.50 per yard.

Grey coursing stone, delivered, $2.25 to $2.50 per yard.

Brown sills and beads, in the rough, delivered 40 cents per foot.

Rubble stone in car lots, $1.30 per ton.

Scotch fire brick, delivered, $30 to $35 per M.

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Hard Wall Plaster, unsanded, $8.50, bags extra; sanded, $4.50 in car lots; hydrated lime, $9.00 in car lots.

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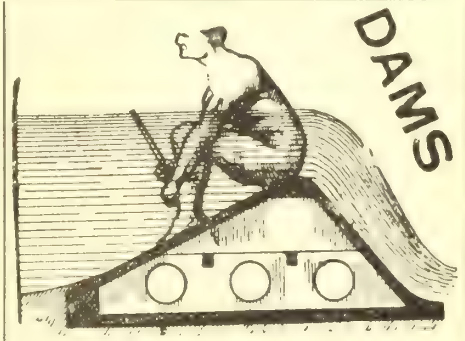

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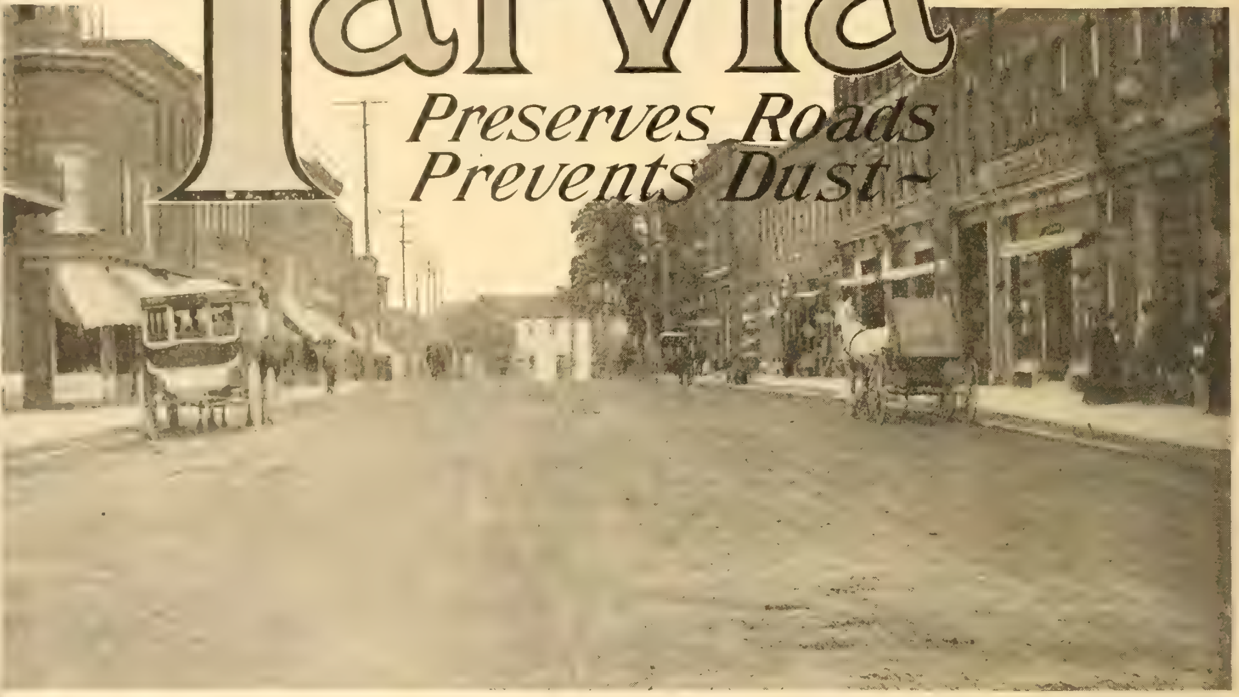

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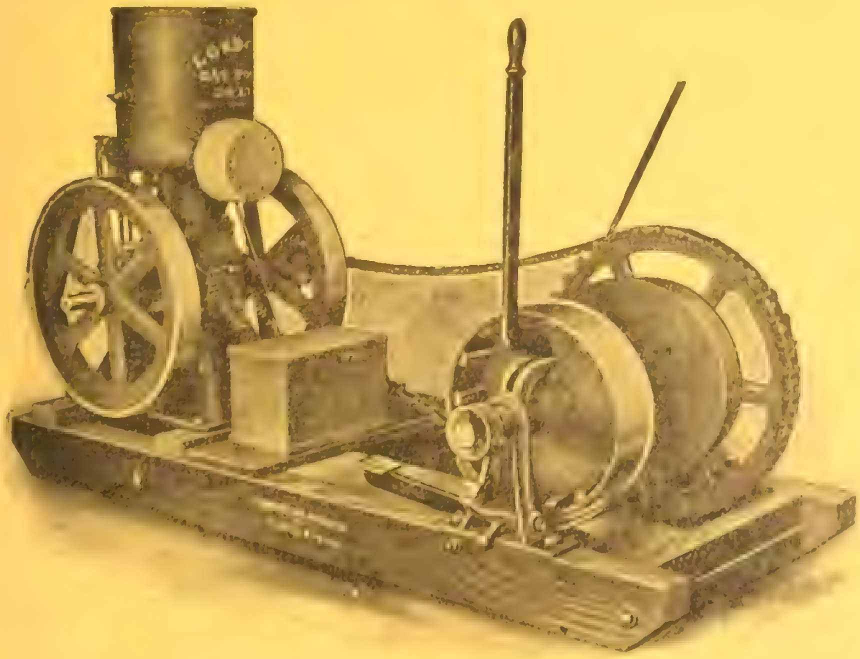

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